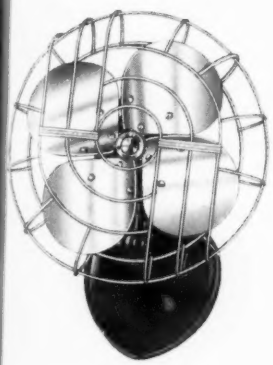
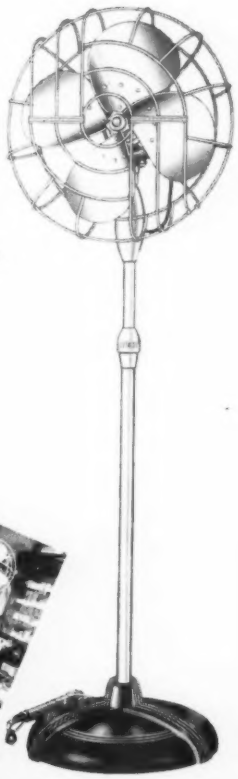
JULY, 1939

ELECTRICAL SOUTH

UNIVERSITY OF FLORIDA



THIS marks the 52nd season for HUNTER in the exclusive production of electric fans. A completely balanced line including the new home and commercial type attic ventilators. HUNTER experience affords expert skill when new experiments are needed to make for unsurpassed performance—quality—style and quietness.



HUNTER FAN & VENTILATING CO., INC.

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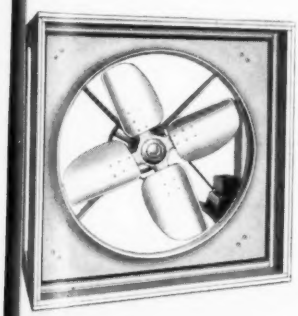
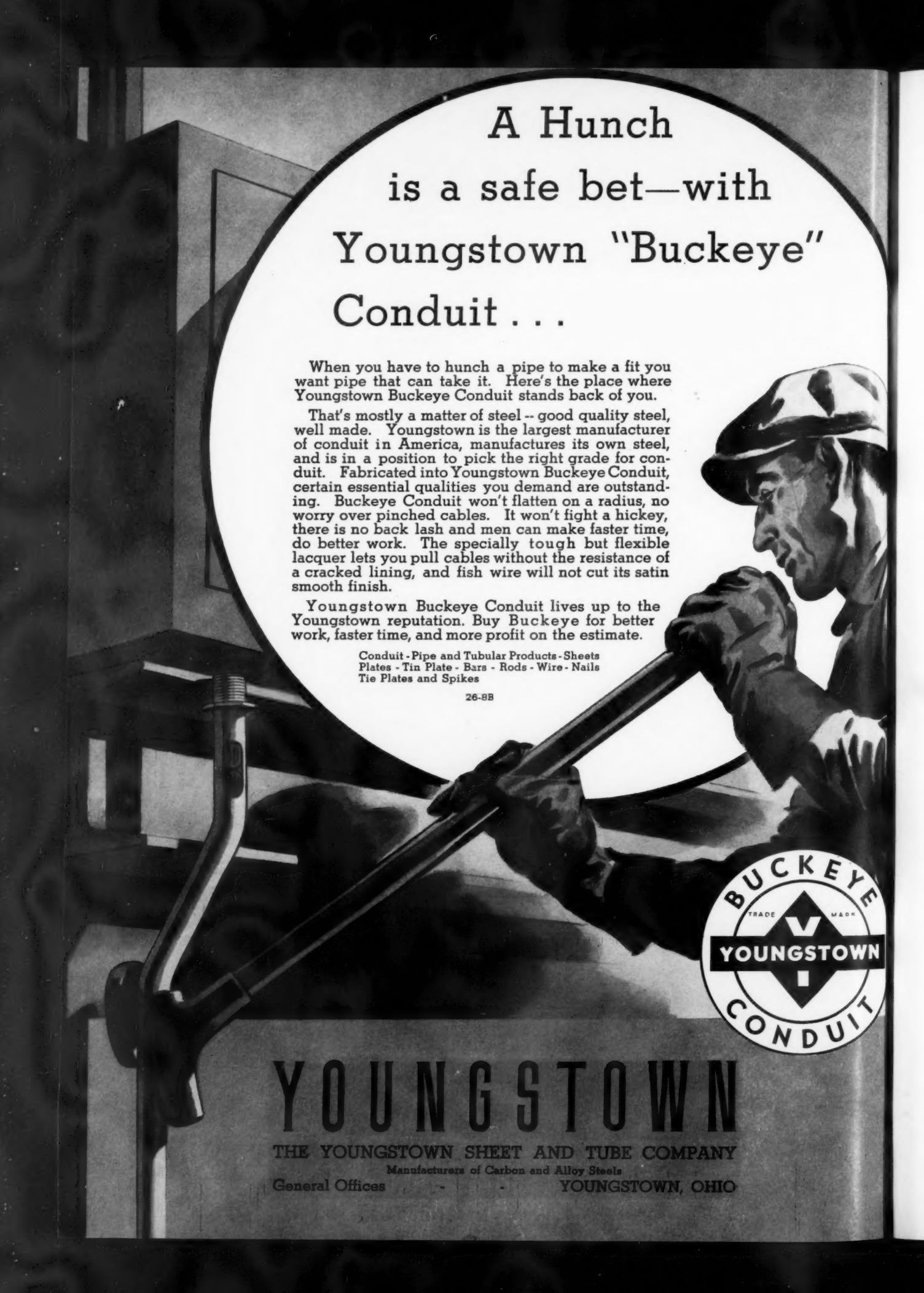
General Sales Offices: Memphis, Sterick Bldg. *Eastern Sales Office:* New York, 92 Warren Street

Sales Offices:

DALLAS PHILADELPHIA BOSTON DETROIT CLEVELAND ATLANTA
CHICAGO ST. LOUIS NEW ORLEANS PITTSBURGH WASHINGTON



HUNTER Century


A Hunch
is a safe bet—with
Youngstown "Buckeye"
Conduit . . .
When you have to hunch a pipe to make a fit you want pipe that can take it. Here's the place where Youngstown Buckeye Conduit stands back of you.
That's mostly a matter of steel -- good quality steel, well made. Youngstown is the largest manufacturer of conduit in America, manufactures its own steel, and is in a position to pick the right grade for conduit. Fabricated into Youngstown Buckeye Conduit, certain essential qualities you demand are outstanding. Buckeye Conduit won't flatten on a radius, no worry over pinched cables. It won't fight a hickey, there is no back lash and men can make faster time, do better work. The specially tough but flexible lacquer lets you pull cables without the resistance of a cracked lining, and fish wire will not cut its satin smooth finish.
Youngstown Buckeye Conduit lives up to the Youngstown reputation. Buy Buckeye for better work, faster time, and more profit on the estimate.
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26-8B
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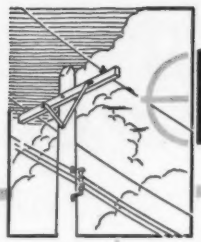
CONDUIT
YOUNGSTOWN
THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices - - YOUNGSTOWN, OHIO

JULY, 1939

Volume 19 No. 7



ELECTRICAL SOUTH

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W. E. COOGLER, Production Manager

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ATLANTA, GEORGIA

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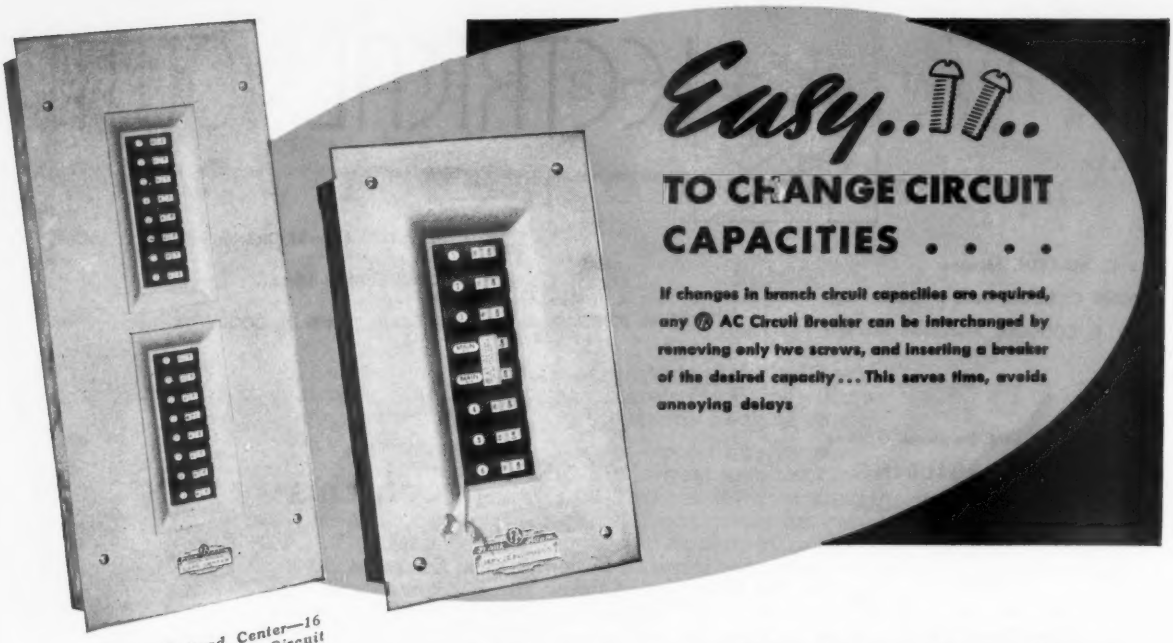

Easy.. It..
TO CHANGE CIRCUIT CAPACITIES . . . .
If changes in branch circuit capacities are required, any FA AC Circuit Breaker can be interchanged by removing only two screws, and inserting a breaker of the desired capacity . . . This saves time, avoids annoying delays

Above: FA Load Center—16 Single Pole FA AC Circuit Breaker Branch Circuits

Right: FA Service Equipment with D. P. 50 Amp. AC Circuit Breaker Main and 6 S. P., AC Circuit Breakers of capacities required.

Contractors are Showing a Big Preference for this New FA AC Circuit Breaker Type

SERVICE EQUIPMENT AND LOAD CENTERS

Here's the popular equipment that's going over big with home owners . . . It's easy to sell — easy to install — and has many features of strong appeal:

Positive, automatic protection against short circuits and sustained overloads . . . No needless circuit interruptions when momentary overloads occur . . . No more "groping in the dark" to restore service . . . Merely return the handle to the "ON" position, after the cause of the short circuit has been removed . . . Operates manually, like an ordinary tumbler switch . . . Unusually attractive appearance . . . Fits on the job — easy to install . . . Ample wiring space . . . Priced right!

For 120 volt AC service . . . Capacities: 15, 20, 25, 35 and 50 Amp. . . . Approved by Underwriters' Laboratories . . . Send for New Bulletin No. 58 . . . Frank Adam Electric Company, St. Louis, Mo.

Stocks Near You
FOR IMMEDIATE DELIVERY
With building booming as it is, one of the most important features offered by FA is your assurance of immediate deliveries from Stock carried by your Distributor. Call him.

ELECTRICAL SOUTH

JULY, 1939

Modern Kitchen Campaign

Florida Power Corporation promotes spring sales of water heaters and ranges in unique cooperative sales contest.

TWO dozen appliance salesmen and as many Florida appliance dealers are waging a hectic "yacht race, sailing to the New York World's Fair," in a spirited sales contest sponsored by the Florida Power Corporation in St. Petersburg, which serves that city and some 130 neighboring communities.

The contest was designed by Robert H. Geidd, new business manager of the utility, to tie in with the Modern Kitchen Bureau's "Guess Again" campaign, and with the national "Check Up" promotion, in the stimulation of spring sales of water heaters. Extending from March 20 to July 20, the contest has for its goal the sale of 1,000 water heaters and electric ranges in the territory supervised by Mr. Geidd's office.

An unusual element in the campaign is the wholehearted cooperation of the utility's appliance sales department with independent appliance retailers. Though the power company does not have a wholesale department, but is on a competitive basis with other retail operations, it has planned the contest to include all retailers who handle approved brands of merchandise, and lends the assistance and cooperation of its salesmen to aiding the dealers in closing sales, without participation in such sales profits.

The territory is divided and assigned to the utility's 24 salesmen and district managers, and the retail stores in each district are a part of the salesmen's jobs, in encouraging their efforts and helping their sales. That load building rather than profit on appliance sales is the chief interest of the utility is shown by the fact that their salesmen's compensation is based on the estimated annual revenue of new line load gained for the company, rather than a commission or drawing account based on appliance sales.

Each salesman is credited with, and is responsible for, the load built by the sales of the dealers in his territory, as well as by his own sales, and the utility's salesmen are instructed not to furnish serious competition for the independent dealers, but to soft-pedal their own sales efforts in favor of aid-

Display windows throughout the territory told the story of the "Guess Again" range campaign and the "Check Up" promotion of water heaters sponsored by the Modern Kitchen Bureau.

Robert H. Giedd, new business manager of Florida Power Corporation is well known in the South for his effective sales campaigns.

ing the dealers.

The contest is set up in the form of a boat race from St. Petersburg to New York, the object being for all boats to arrive in New York. The distance is considered 1,000 miles, a mile for each unit of the quota which the utility has undertaken. For check-up periods during the contest, three "ports of call" have been designated, Key West, which is considered 250 miles, or one-fourth of the distance, Jacksonville, 500 miles, and Norfolk, Virginia, 750 miles. As each month of the contest passes, it is the aim of the power company to see the quarterly distance achieved in total sales.

Three prizes are offered for the salesmen, or "yacht captains" achieving the three highest percentages of their individual quotas, first prize being a six-day trip to the New York Fair on the Clyde Mallory Steamship Line, including sufficient funds for a week's stay in New York. Second prize is $35 in cash, and third prize $25 in cash.

Dealer Prizes Awarded

Another evidence of the utility's cooperation with the dealers is the establishment of a similar set of prizes for the three dealers whose individual organizations close the highest percentage of their quotas. The first prize is the same with the exception of the expense funds; the passage to and from New York is offered to the dealer group and the the second and third prizes are the same.

Utility salesmen's quotas are composed of their own personal sales expectancies, plus the sales quotas assigned to the dealers in their respective divisions, the usual quota being 8 ranges and 6 water heaters per man in each organization, though adjustments were made in some cases of uneven population.

Each dealer was notified of the quota assigned other dealers; records are kept from the power company's salesmen's weekly reports, and from reports filed by mail to the utility by out of town dealers. The only requirement of the dealers for participation was that they be legitimate selling organizations, handling sound, quality merchandise and that they put forth as much effort as possible in supporting the "Guess Again" campaign, by sales efforts and displays and advertising.

Every substantial dealer in St. Petersburg enthusiastically acclaimed the contest, and several established cash prizes within their own sales organization for their retail men. Nearly every dealer is maintaining throughout the duration of the contest an elaborate window or floor display featuring the Modern Kitchen display material, and is tying in small newspaper ads with the larger space run by the power company. Several dealers have undertaken direct mail campaigns to non-range owners and to prospects for water heaters, using the Modern Kitchen imprints on their letter heads and literature.

An advertising schedule including space in 42 different Florida newspapers is now running, and local dealers are advised of forthcoming insertions in their local papers, so that they can place ads of their own to capitalize on the utility's spread. Considerable outdoor postings have also been sponsored by the power company, who also uses the "Guess Again" motif, printed in two colors, on the reverse side of all electric statements.

Chart Indicates Progress

Progress of the contest is charted on a large scoreboard which hangs in Mr. Geidd's office, upon which is drawn a map of the Eastern Seaboard. The course is charted out, showing the three ports of call, and small cut-out yachts are used to mark the progress of each salesman, being moved to the point which his sales have earned each week. The names of the salesmen, who are called "skippers" and "navigators" are listed on the board, and a space is provided at the bottom for a weekly posting of the leader in each division. The divisions of the contest mean nothing except an indication of the geographical operations, certain of the men working under the supervision of division managers L. B. Lovett and J. P. Coombs, who operate from Ocala and Appilachicola.

Graphic displays are arranged by the utility company in its show windows and on its floor, and are changed frequently. The theme of "guess again about the expense of electric convenience" is carried throughout all of them. One display featured a contrast between

Model kitchen of W. M. Kyle, one of the cooperating dealers.

the modern kitchen and that of twenty-five years ago, showing a dingy old kitchen with wood stove, no water heater, and an old fashioned wash-boiler and tubs. In the window facing this one was a bright, modern kitchen array, with electric range, water heater, and washing machine.

Another window set bore front outlines of a modern automobile and of a 1925 model, with the slogan "The speed and efficiency of electric cooking and water heating may be compared with the progress of modern transportation." The economy of electric water heating and cooking was illustrated by a fascimilie of an ax cutting a banknote in two.

One very effective display was arranged showing one of the first electric ranges built, a model R-1 General Electric built in 1916. It had been sold by the Minnesota General Electric Company on March 27, 1916, for $88.20, and a certificate attesting to its satisfactory performance over a period of over twenty years hung on the wall beside it. The range had been taken in trade by William F. Davenport, Inc., at 556 1st Avenue North, one of the participating St. Petersburg dealers.

Other St. Petersburg dealers engaged in the contest are: Ace Radio Company, Brinson Electric Company, Campbell Hardware Company, Frank & Murray, G.E. Electric Service Company, Gulf Radio Sales, Hibbs Hayes Electric Company, Kessler Electric Company, W. M. Kyle, Montgomery Ward, John C. Morgan Company, T. H. Rifley, Sears Roebuck, and Todd Hyatt Company.

Participating dealers have lauded the cooperation given them by the utility, and particularly the impetus given their efforts by the training classes and cooking demonstrations held regularly by the power company. Each week, in the company's offices in St. Petersburg, a class in electric cooking is held for the salesmen, wherein the important points of use and control of electricity in cooking are

(*Continued on page* 46)

Upper right, scenes in St. Petersburg as Florida Power Corp. salesmen learn details of the contest. At right, center, J. E. Averett, sales manager of Savannah Electric & Power Co., points to the "progress map" used in campaign along similar lines. Some of the Savannah salesmen flaunt their nautical caps in the yacht race contest.

Electrical Statistical Data Released by Institute

THE continued expansion of electric service in spite of the great decline in general business activity during 1938 is emphasized by the Edison Electric Institute in its Annual Statistical Bulletin, released in June by C. W. Kellogg, president of the Institute.

"The most significant aspect of the year's operations" the Bulletin states, "was the further increase in the use of energy by residential, farm and small commercial customers. This growth occurred during a year when the general level of business was below that of 1937. It is further evidence of the results achieved by the continuing efforts of utility companies, in cooperation with appliance dealers, in building up load and of the growing recognition by customers of the value and cheapness of electric service in the home, on the farm and in small commercial establishments."

Commenting on the increased stability which has been occasioned by the greater diversification of the use of electricity since 1926, when comprehensive electric statistics were first collected, the Bulletin states that: "The marked change which has taken place in the last thirteen years in the proportion of the total energy used by different classes of customers is emphasized by the fact that, in 1938, 17 per cent of the electric energy distributed was for residential use—as compared with only 9.7 per cent in 1926.

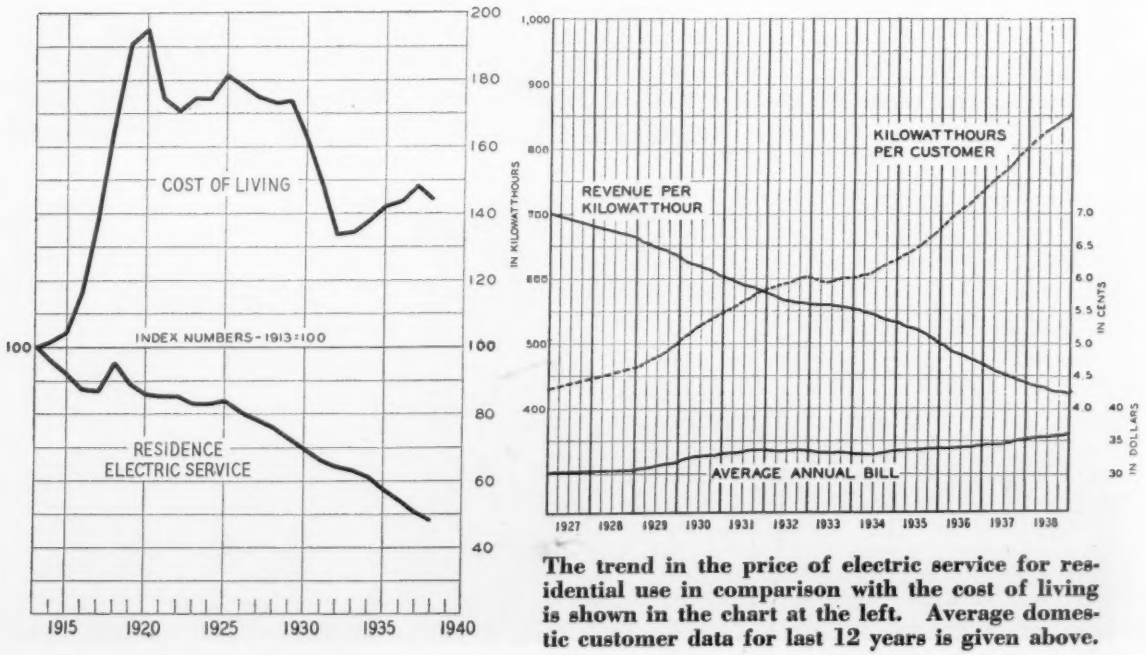
"Small commercial customers consumed 16 per cent of the total energy distributed in 1938, against 13.5 per cent in 1926, and large light and power customers took only 40.4 per cent in 1938, compared with 46.2 per cent in 1926. The growth in the use of electricity by residential, farm and small commercial customers has increased the stability of the industry markedly over the last thirteen years and is evidence of the more general acceptance of electricity by these customer groups."

Steam Power Decreases

In summarizing the statistics for the year 1938, the Bulletin points out that the decline in power output during 1938 was wholly confined to that produced by steam. Including purchases from Boulder Dam and other sources, production of electricity by water power totalled approximately 44,750,000,000 kilowatt-hours, as compared with 44,388,000,000 in 1937. Production by steam, however, decreased by 7.3 per cent from 74,206,000,000 kilowatt-hours in 1937 to 68,765,500,000 in 1938.

Sales to ultimate consumers amounted to 93,894,000,000 kilowatt-hours, a decrease of 5.6 per cent from the record level of 1937. The decline of 16.1 per cent in sales to large power users was offset, in part, by further increases in the use of electricity by residential, farm and small commercial customers. Kilowatt-hour sales to farms totalled 2,528,000,000, an increase of 5.8 per cent; to residential customers, 18,461,000,000 an increase of 9.4 per cent; and to small commercial customers, 18,316,000,000, an increase of 4.3 per cent.

At the close of the year, the electric light and power industry was serving 27,851,471 customers of all classes, an increase of 687,484 customers or 2.5 per cent over the close of the previous year. Of these total customers, 1,406,579 were farms, which represented the addition of 165,074 during 1938. Revenues received from sales of electricity to all customers amounted to $2,168,495,200; a decline of $12,292,400 from the year before.



The trend in the price of electric service for residential use in comparison with the cost of living is shown in the chart at the left. Average domestic customer data for last 12 years is given above.

In contrast to the decline in revenues, total expenses showed further increases. The preliminary income statement carried by the Bulletin, indicates that, while operating expenses registered a slight decrease (due largely to the very favorable water conditions which resulted in the saving of some 2,000,000 tons of coal) taxes and charges for depreciation continued their upward surge. Taxes grew by about $12,000,000 and provision for retirements and depreciation by a similar amount.

"Accounting costs," states the Bulletin, "were increased considerably. Requirements of governmental bodies, largely for statistical purposes, as well as the extension of service into rural areas, have greatly increased accounting expenses. It is conservatively estimated that the industry spends annually some $12,500,000 in the filing of reports with regulatory and other bodies." As a result of these factors, it is estimated that net operating income declined by 2.6 per cent from 1937 and net income, after all charges by 6.2 per cent.

At the close of 1938, the plants of the electric light and power industry, including the TVA, the rural cooperatives and municipal plants (but excluding other federal projects) had a generating capacity of 36,330,380 kilowatts, a net increase (over plants dismantled) of 1,370,039 kilowatts. Steam plants showed a net increase of 1,261,608 kilowatts, or 92 per cent of the total, while water power plants gained 29,915 kilowatts. Diesel engine plants registered a net gain of 78,536 kilowatts.

During 1938, approximately $482,000,000 was spent for new construction and modernization by the electric light and power industry (exclusive of federal projects); the largest sum spent since 1931.

"The year 1938," states the Bulletin, "was marked by a slowing up in the record sales of appliances established during 1937. This decrease, however, did not deflect the continued vigor which has accompanied the several promotional programs initiated in the past four years, among which are 'Better Light—Better Sight'; 'The Electric Water Systems Council'; 'The Commercial Electric Cooking Council' and the forward looking activity comprising the 'Modern Kitchen' program.

(*Continued on page* 10)

Pump Installation Records Help Sales, Service

"WITH some 2,500 electric water pump installations to his credit, J. D. Northrup is rightfully considered the Dean of the water system business in Houston, Texas, and vicinity. "We sell several hundred electric pumps for water systems annually," says Mr. Northrup. He continues, "These water systems cost from $90 for a small home up to $3,700 for some of the major installations for the suburban estates in our locality."

Mr. Northrup is sole owner of the firm of Northrup & Clark, 615 Preston Avenue, Houston. He employs two outside salesmen to sell and install water systems, one of these men being his son, Cecil. "Any dealer has to do a certain amount of bird dog solicitation to sell electric pumps," says this veteran dealer, "but the electric lighting and power company can and does render a lot of assistance to all the appliance dealers in our market. They cooperate with us and the other pump dealers by sending us a list of prospects at any time they are extending a rural line for two or three miles.

"By having this advance information, we ourselves and other legitimate dealers contact the prospects and sell them adequate water systems before these prospects have time to buy some mail order pump or some system that is inadequate."

In brief, Mr. Northrup's pump selling plan is this: He stresses adequate and correct systems for the job, refusing to sell anything less; he sells pumps by showing what they will do, using a demonstrator in the store and by taking prospects to see other installations in actual operations; he keeps a complete stock of parts and a complete record on every installation made.

"We sell a lot of quarter-horsepower pumps for small homes in the suburban sections; then the average installation for the country sales is about 360 gallon capacity per hour. However, we sell plenty of jobs that run $500 and $1,000 each, and a few that run much more. A number of recent sales include such jobs as one 6-inch turbine with a 1000-gallon pressure system to supply 40 gallons a minute under 55 pounds pressure; another 6-inch turbine with 1500-gallon pressure tank—and yet others of similar size and comparison.

"One recent installation included fire hydrants around the house and buildings. This is a factor that electric pump dealers can stress, for

A complete water system connected for actual operation is one of the important features of the Northrup & Clark display.

fire hydrants reduce the fire insurance rate of rural property drastically and it is a real selling point in favor of an adequate water system."

When a prospect comes into Northrup's place of business to inquire about a pump, he is first asked where he lives. A log of the water wells and the conditions of the entire vicinity is on record, and when this dealer knows where the prospect lives, he then recommends a certain type of pump, and one of sufficient capacity to take care of present and future requirements. The prospect may even ask for a suction type pump when his water level is 30 feet; and Northrup refuses to sell anything but a cylinder type job for a water level below 22 feet. "We don't lose many sales because we refuse to sell anything but the right equipment, of a size sufficient to do the job," reports this dealer, "but we find it better to miss an occasional sale than to sell something that will cause a complaint. We have never had to change or replace a pump that we have installed!

"Now our strongest selling point is that of referring a prospect to some user or taking him to see other installations. We have been so insistent upon selling the right job that many of the wealthy people who own homes on the bayshore, and many of the dairy operators, poultry raisers and others with country homes merely instruct us to put them in a water system and we give them the cost when the job is finished.

Good Parts Stock Turnover

"We don't have much trouble from a service standpoint, but after making an installation, we go back the next week to see how it is working. The user is generally pleased and has the name of two or three other good prospects who have seen his pump and are interested in one like it.

"The average life of an electric pump is seven to ten years. We don't advise our users to keep them longer, and when they reach that age, we take them in trade and install a new system. We can rebuild the trade-ins and find a ready sale to people who cannot afford new systems."

A thousand dollar stock of parts for electric pumps is carried by Northrup, who turns this stock five times a year at a good margin of profit. He gets a good turn-over because his stock of obsolete parts is nil. A record of the size, serial number, etc., of every pump installation is made. At any time a customer comes in for a replacement part, he can get just exactly the right part because Northrup has a complete record of the unit in operation. Then by checking back through these records, it is easy to determine the obsolete stocks and to start weeding out any item for pumps of more than 10 years of age, for replacement sales are made for these pumps.

Another advantage of these pump installation records is that any prospect who comes in can be referred to some pump in use near him, or if the salesman wants to know something about the types of pumps in use in that particular community, he can refer to some user in that community and find out just what pumps have been installed.

Although pump sales represent the principal business of this firm, Mr. Northrup is said to sell more automatic electric switches than any one else in Houston. A good stock of switches is kept and an installation service is always ready. Every installation of any electric unit is done right, loads are checked, and if a line is overloaded, the lighting and power company is notified immediately.

Washer Rental Plan Profitable

AN appliance dealer wouldn't think of asking customers to pay for demonstrations, yet thae is in effect what happens under a rental plan for washing-machines and vacuum cleaners used by Anniston Electric Company, Birmingham, Alabama.

"A charge of $1.00 per day is made for the rented appliance which is delivered by a salesman," explained Frank Kirby, president and merchandiser manager. "A big portion of our washer and sweeper sales originate through this source. The customer stamps herself as a definite prospect for one of the appliances when she applies to rent one. That means she doesn't have the appliance but has a need for it.

"Our salesmen deliver the washer or cleaner without much ceremony, and demonstrator machines are used in our rental service. He then goes back in two or three days and quite often finds a customer who has sold herself on the value of the appliances. If she is interested in the purchase, the salesman offers to let the amount of the rental apply on the purchase, in fact shows the customer where she can buy cheaper than she can rent.

"This has been a sure-fire source of sale for us, so that we advertise it in the newspapers. Also our salesmen in their contacts find they can bring a hesitating prospect into line by offering to rent them the appliance for a few days with the understanding that the amount of the rental may apply on the purchase if desired. This gets around the fear of some prospects that they they may be contracting for something they should not. Sometimes for instance a wife has to sell her husband on the appliance and that takes a little time. If she fails she can say she was renting the machine; but few of them fail.

"The washing machine was our most sensational seller for the past 12 months, business being good in season and out. Refrigerators, however, continue to be our biggest volume producer. Range sales have shown quite a pickup.

"Depression Proof" Business

The business of the Anniston Electric Company was established on a "depression-proof" basis for a specialty store after recommendations by manufacturers and jobbers. It has the exclusive line of one leading manufacturer and handles small appliances as well as large ones, its rental of washers and cleaners being evidence of the diversified business. A good business, for instance, is done in electric churns with sales of this item on a par with those of electric irons.

A store just out of the high rent district was chosen, a space renting for only $30.00 per month. Wiring and other contracting jobs are handled, the electricians working by the hour. The salesmen work on commission, so when there is no business there is no salaries to pay, but when there is money to be made the salesmen and the electricians share in this. This setup has worked remarkably well according to Mr. Kirby. One of his salesman, Wyatt Mickle, was the first this year to qualify for the Westinghouse Quota Busters' Club. Mr. Kirby himself is a member of the club.

ANIMATED DISPLAY

Texas Electric Service Co. greatly increased floor traffic through its animated "circus" display featuring Reddy Kilowatt performers.

TEXAS Electric Service Company, of Fort Worth, does much toward popularizing electric appliances through newspaper and radio advertising and displays.

Of the three mediums, TESCO officials find that display is about the most effective in attracting attention and telling a sales story, especially if displays have entertainment value. So recently the company staged a group of animated displays in a big way, with excellent results.

The display that has attracted most attention was the "TESCO Circus," appearing in its show windows and display room in Fort Worth, through March. It had all the features of the big-time circus, including trapeze artists, animal acts, merry-go-around, and ferris wheel. Nearly all the features were animated, and the chief difference between this and a real circus was the size, which was reduced to the stature of its performers—Reddy Kilowatts, usually two or three feet in height.

Throughout the month children and adults crowded the sidewalk in front of the Texas Electric Service Company building. Even people on the other side of the street stopped to look at the circus, and frequently cars passing the building slowed down, holding up the down-town traffic.

The chief performers in the circus were Reddy Kilowatts, symbolic electric servants, and many of the feats were made to represent difficult jobs performed by electricity.

Most TESCO displays tie up with seasons or events, and this one was originally planned to take advantage of the interest in the Southwestern Exposition and Fat Stock Show, one of Fort Worth's most important annual events, during early March. The event came and ended, but interest in the TESCO circus showed no decline, so its ending was postponed and the display kept intact through the rest of March.

Interest in the circus, as planned, aroused interest in electric appliances. There was a general increase in sales of appliances over the same period of last year throughout the city. How much of this increase was due to the circus is hard to say, but in view of the interest it aroused, it undoubtedly had much to do with the gain.

Like other TESCO promotions, this one was planned for all electric appliance dealers in the city. The main show, of course, was in the TESCO headquarters because it is exposed to most traffic by reason of its central location and the fact that most users of electricity come to pay their bills here. Then, too, the place has more display space than any appliance dealer in town. However, there was a definite tie-up with the dealers, most of whom displayed show cards in their windows and show rooms, tying in with the circus theme.

The man responsible for TESCO and dealer tie-up displays is Lelan Broadus, display manager of the Texas Electric Service Company. Together with members of the advertising and merchandising departments, he plans promotions in advance. Once a program is formulated, the dealers are informed about it and supplied with all the necessary helps. They stock up with appliances scheduled to be promoted, and the campaign gets in full swing.

Showmanship plays an important part in TESCO displays, as is evidenced in the circus campaign. In the window next to the entrance to the show room, for example, Reddy Kilowatt, dressed in barker regalia, with cigar in mouth, points with his cane to a sign stating, "Admission: Just go steady with Reddy." Flanking the barker's stand are signs. One, illustrated with a smiling man shaving, states, "For

The TESCO Circus had all of the features of the big tent: animal acts, trapeze artists, merry-go-round, and ferris wheel. Terse sales messages were interspersed with the acts.

A view of the utility's spacious display floor. Two Reddy Kilowatt figures, poised directly over the cashiers' cages at the end of the hall, performed continuously during the "circus."

clean shaving — Good bathroom lighting." Another, picturing a well appointed room, conveys the message, "It costs little to modernize lighting. More livable living rooms with light conditioning." A third sign, picturing a kitchen, gives the information that "Kitchen work sails along faster in good lighting."

In other windows, Reddy Kilowatt makes a polar bear balance a toaster, a ram do a balancing act on a drum, and other animals perform other feats. But it is in the showroom itself that most of the animated acts are performed. The miniature merry-go-around, with Reddy Kilowatts riding it, is plainly seen from the outside through a window. Next to the elevators, seen from the lobby, is about a ten-foot high ferris wheel. But the most daring acts are those of the trapeze performers. Two Reddy Kilowatts incessantly swing and go through contortions over the cashier's window. This trapeze act has attracted the most attention, according to Mr. Broadus.

The show has been responsible for many inquiries at the TESCO showroom and at various dealers' in Fort Worth. TESCO officials reported a four per cent increase in sale of electric current over March of last year, and a sharp increase in sales of smaller appliances. Inquiries among dealers indicate a substantial increase in sales of larger as well as small appliances over March of last year. The circus, of course, spotlighted small appliances, although all types were displayed.

Regardless of how many items the show has been responsible for selling, the circus was considered a success by most of those affected. It has aroused interest in appliances and this, most dealers consider, is the first step toward selling in the future.

Drive-In Entrance For Radio Service

THE rear entrance to the store of Walther Brothers, Inc., radio and appliance dealers and distributors, Montgomery, Alabama, looks almost like the entrance to somebody's garden, in comparison to the average store's backdoor with its miscellaneous litter. The rear entrance and lot have been dressed up and made into a drive-in station for automobile radio service.

The lot was closed in by a fence of white lattice work, leaving a wide entrance gate. An attractive arch over the gate prominently advertises the firm's service. Evergreen shrubbery on each side of the gate makes it more attractive. Gravel surfacing of the lot, a canopy and painted signs on the rear of the building complete the inviting effect.

It should be needless to say that this improvement has increased the sale of radio service to car owners and enlarged the store's contacts with customers.

In addition, since there is considerable traffic along the street on which this lot is located, their "pretty backdoor" is a good general advertisement.

Utility Statistical Data Released

(*Continued from page 7*)

"Greater use of electric appliances, which have gone into the farm and urban homes following the aggressive promotional activities of the industry in cooperation with dealers and manufacturers, has brought the average annual use in the non-farm home to 845 kwhr per year and on the farm to 1,045 kwhr. Prior to 1926, the domestic load consisted largely of lighting and smaller appliances. The use of electricity in American homes in 1926 was less than the total used for motive power on street railways.

"By 1938, residential electricity use had tripled and was three times that used for railway motive power. Utilization of energy in the home increased 52 kwhr per customer in 1938 over the previous year, while the average revenue per kilowatt-hour for this service dropped to a new low figure of 4.21 cents, a decrease of 4.1 per cent from the average revenue in 1937."

Drive-in entrance that greatly increased auto-radio service.

Dramatic Evening Demonstrations Account for Sales Increase

"NO one has ever discovered a substitute for 'hard selling' methods," is the summation Sales Manager "Cy" Young offers for the excellent record his store has made during its first six months in the appliance merchandising business. Born in the darker days of 1938's recession, Mr. Young's firm —the Tennessee Valley Electric Company, Westinghouse dealers in Chattanooga, Tennessee—practically doubled its sales quota for the first six months it was in business.

Analyzing the Tennessee Valley Electric Company's method of selling electric appliances, one can easily discern why the firm has flourished, shown a profit, and established an enviable reputation in the community. Mr. Young's explanation of "hard-selling" is the answer to those dealers who have taken a half-hearted interest in the merchandising of electric appliances.

Lower Rates Expected

Mr. Young expects to sell six hundred major electric appliances if the territory continues to be as receptive to the use of electrical appliances as it has been in the past. The new low TVA rate schedules will be of immeasurable assistance in reaching this goal, but the company has done an excellent job under present conditions.

In discussing selling methods Mr. Young explains that although seventy-five per cent of the sales were "closed" in the field, a larger number originate on the sales floor. The salesmen take advantage of the sales floor for demonstration and a follow-up is made immediately to the home where most of the contracts are closed. One of the most important contributions to the firm's success has been the opportunity given the salesmen of bringing in prospects to the store at night. The salesmen are given keys to the sales floor and are at liberty to bring the prospects in for a closer and more comprehensive examination of the product. Experience has proved to the firm that a large per cent of the sales made are closed in the store after hours, as the salesman can present his story and his demonstrations in the quiet and comparative solitude of the store when floor traffic doesn't cause frequent interruptions.

Dramatic demonstrations are always a part of these "after-hour" sales presentations. These demonstrations are made regardless of the progress made prior to the store visit. The prospect is given the most complete story the salesman knows, and then is in a better condition to make a decision before considering a competitive product. Mr. Young cited a sale that was closed by using this method of a complete and dramatic story of quality and use after a competitor had already offered an allowance that was more than double the allowance his salesman could offer.

"If only salesmen will take the time and trouble to explain all the advantages his product will give, the prospect is in a better position to return a favorable decision. Ignorance or a lack of knowledge about a product has been the cause of more lost sales than any one other single cause," Mr. Young tells salesmen.

Another sales tool Mr. Young uses is that of following sales with service calls and inexpensive gifts. His salesmen call at the home with a half dozen bottles of a popular soda drink the day after a refrigeration installation has been made. They put these bottles in the new refrigerator, give hints for other desserts and refreshing drinks—and at the same time, find out whether or not the new customer is a prospect for an electric range or water heater.

Refrigerators on the sales floor are kept loaded with desserts, meats and vegetables so the salesmen can talk more convincingly of the merits of the various food preserving features. Prospects entering the store are served a dish of ice cream or some other dessert prepared each morning. All of these sales ef-

(*Continued on page* 46)

Complete dramatic demonstrations performed in the evening after regular store hours is credited by "Cy" Young of Chattanooga for a large part of the rapid growth of his dealership.

"Selling Will Create Business"

FEATURING the slogan "Selling Will Create Business for 1939," New Orleans Public Service, Inc., presented its 1939 cooperative sales campaign plan to one of the largest meetings ever to be held by the electrical industry of New Orleans. More than 650 representatives of the utility, dealers, contractors, wholesalers and manufacturers were in attendance.

E. N. Avegno and H. E. Meade, both of the sales department of New Orleans Public Service, addressed the meeting. A sales presentation based on two large illuminated charts and several stage skits were features of the program.

Each dealer and contractor was presented with an elaborate, constructive and detailed prospectus of the opportunity for greater electrical and gas sales; told how these sales might be made; and offered the extensive facilities of the utility to assist such sales.

The prospectus represented a detailed study of the possible market for electrical appliances, showing the extent of saturation in each appliance in New Orleans and other specific information to enable an electrical dealer or contractor to know his market and to attack a sales drive intelligently.

Some of the family needs cited to the contractor-dealer group were: 61,020 electric washing machines, 89,000 attic fan installations, 49,860 electric refrigerators, and 68,040 modern radios.

The prospectus showed an increase of 30 per cent in usage of electrical current since 1934 and pointed out that dealers and contractors might take advantage of this indicated desire for better living through greater use of electricity.

Cooperation of the utility company in aiding and not competing with the retail dealer was cited by the prospectus in showing that 87 per cent of the dollar volume of appliance sales last year were made by the dealers. The utility sold no radios, attic fans, or air conditioning and few other appliances.

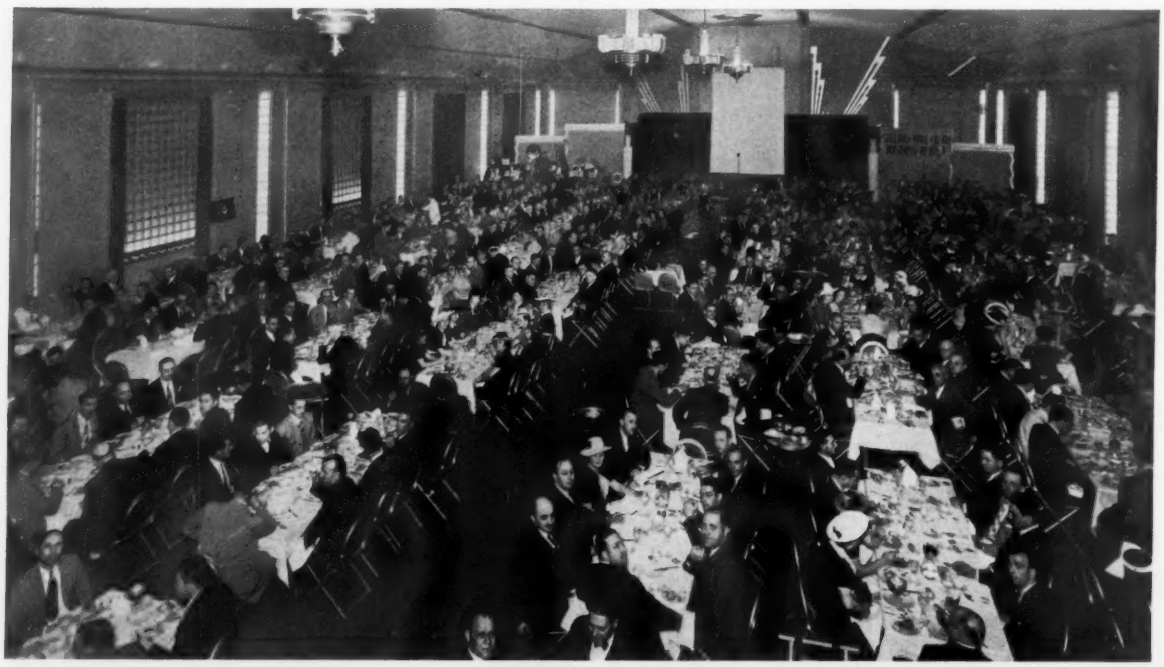
The program showed residential customers for electricity increased from 68,949 families in 1934 to 90,226 in 1938, or a total of 21,277 new electric customers in the New Orleans area to be reached this year with appliances.

The sales campaign was divided for the various appliances with attic fans and air conditioning extending to September 2; refrigeration from April 10 to September 2; lighting September 5 to December 23 and a renewed refrigeration drive from October 30 to December 23. A sustained drive for health and labor saving devices will be carried on.

The utility company announced it will "continue its extensive policy of advertising the value, cheapness and use of electric and gas services." It also offers training courses in lighting and appliance salesmanship for the industry's sales people.

The company announced its representatives will make 320,000 con-

(*Continued on page* 17)



Exactly 666 representatives of the electrical industry of New Orleans gathered recently to hear plans for one of the most aggressive campaigns ever sponsored by New Orleans Public Service. Attending what was probably one of the largest meetings of its kind, the industry was enthusiastic about the slogan of the campaign: "Selling Will Create Business for 1939."

CONTRACTING SECTION

There may not be enough outdoor lighting jobs of the size of this one to keep all contractors busy but for every large job of this kind there are hundreds of smaller installations that can be sold.

INCREASING OPPORTUNITY FOR CONTRACTORS IN OUTDOOR LIGHTING SALES

By Roy A. Palmer

Illuminating Engineer
Duke Power Company

OUTDOOR lighting has grown in spite of the electrical industry. That's a pretty strong statement to make against the industry but it certainly is true that we can't take much credit for the job that has been done on outdoor lighting over the past several years. We have not done a real promotional job in this field.

Outside of the credit we must give to a few lighting equipment manufacturers who have done some very creditable advertising and constantly made available excellent direct-mail campaigns on outdoor lighting, our efforts have been rather spasmodic and weak. What outdoor lighting we have, has been created largely by the demand on the part of the customer. As a consequence much of it is far below the standard that it should be.

This situation has created a practically virgin market for the electrical contractor who is looking for new fields to conquer. Here is an opportunity to create wiring and lighting equipment business with profit and with much less competition because few contractors realize the opportunity for business in this field. Today we have more equipment than ever available for filling the needs of every outdoor lighting job. Much of it is new to the customer which is an additional incentive for the contractor to make a contact and start a sale by showing the new equipment and how it can be applied.

Thus we have a virgin market, less competition, new equipment and sales arguments which will lead to greater profits to those contractors who are willing to do a little footwork and talking to sell the idea of outdoor lighting. Let's analyze the field for this class of lighting and see how we can best approach the selling problem.

Utilitarian Applications

There are many places where light is needed outdoors to help workmen to see, or in other words, a purely utilitarian lighting application. Loading platforms and yards are often poorly lighted and in some instances not at all. Very often trucks are loaded after offices and plants are closed to take advantage of lighter road traffic during the night. Outdoor storage, industrial yards, construction projects and parking areas also fall in this classification.

The sales approach in outdoor utility lighting is the saving in time, the high cost of delays, safety of the workers, and the value of the workers' time in comparison with the small cost of light. The customer is primarily interested in what the lighting will accomplish. The equipment, such as floodlights, lamps, etc., are only of secondary interest. Too often the customer is approached with a sales story on the equipment which are only the tools with which to accomplish the job, and by thus putting the cart before the horse, the sale is lost.

It is perhaps only natural that we should do this because all of us in lighting work must know the kind of equipment to do a certain lighting job. Mnaufacturers' representatives have perhaps done a good job in placing their equipment foremost in our mind. To the contractor, the equipment is his source of profit. But regardless of

Roy A. Palmer

our interest, we must take the customer's viewpoint when selling any kind of lighting and outline the specific advantages which that lighting will produce. A discussion of price should never be initiated until after the customer has been told of all of the advantages.

While prospects for utilitarian lighting are sufficient to keep many contractors busy, there are several equally fertile fields in outdoor lighting prospects. For example, there are innumerable opportunities for new business in outdoor lighting for sales. The well-lighted filling station definitely secures more customers. Some years ago this was proven in Texas where a series of tests were made to determine the effect of light on sales. When lighted up to modern standards sales increased 25 per cent. To check this, the stations were dimmed by underlighting them for a 30-day period. Sales slumped 25 per cent. Another important point: daytime sales fell off materially when the night lighting was reduced, but came back when the lighting was bumped up again!

Lighting Up for Sales

Those facts are interesting to your prospect. If you owned a filling station wouldn't you be interested in knowing that good, up-to-date lighting would (1) increase sales by attracting more customers (2) keep as daytime customers those you have sold at night and (3) bring back tomorrow as customers people who have been impressed with the appearance of your station at night? And these facts apply similarly to ea'ing places, beer gardens, tourist camps, golf driving ranges and roadside stands.

There are many more people who will stop to eat at a well-lighted tavern or highway restaurant that suggests cleanliness, friendliness and progressiveness than those who are looking for gloomy, dingy places that bespeak questionable character and service. Strange to say, many owners of roadside establishments don't know of the advantages of better lighting principally because they have never tried it.

Incidentally, outdoor lighting does not mean only the sale of floodlights. It has possibilities for the sale of interior lighting equipment for the roadside stands, eating places and other establishments in this classification. Standard porcelain enameled reflectors also can be utilized in many applications. The new 150-watt flood and spot lamps open up marvelous possibilities for sales in innumerable places. Being made of pyrex glass, they will stand up in rainy weather. Fluorescent lamps, too, have many applications in these places for decorative as well as utilitarian lighting, although they must be fairly well protected from the weather.

New Products Help

The new 500-watt photoflood lamp is excellent for demonstrating to a prospect how his place would look when equipped with 1000-watt floodlights. A demonstration is a most convincing and effective method of selling outdoor lighting because most everyone has difficulty in picturing in his mind the lighting effect which will be produced. These lamps have a 6-hour life average but they are being successfully used by some oil companies to supplement the lighting of new filling stations for the opening night.

Another field of outdoor lighting which has scarcely been touched is the real estate business. Portable equipment for temporary lighting of homes for sale or rent will pay the rental agency many times over in the investment involved. Homes floodlighted will stand out at night and be noticed by many more people than even would observe them during the day.

The same applies to commercial buildings. Even a small store can be floodlighted to advantage when looking for a new tenant. Such floodlighting not only calls attention to the building but it becomes definitely identified in the public mind even though the lighting is not continued after the building becomes occupied.

An outstanding example in the value of floodlighting a commercial building is the Wrigley Building in Chicago. When it was first completed it was predicted that it would be a failure due to lack of tenants. Instead, it quickly became popular to which fact floodlighting was given the greatest part of the credit. Even today, it remains as one of the best-known buildings in the world.

Real estate offices as well as mortgage companies or banks dealing in real estate can utilize floodlighting to advantage. This is the least expensive advertising that the real estate concern can buy—and it is a most effective means of placing the organization foremost in the minds of the public.

Lighting Real Estate

The real estate field has been sadly neglected as lighting prospects. Selling or renting a building requires a certain amount of advertising. To floodlight that building singles it out at a time of the day when most people are at greatest leisure and their attention can be attracted without competition from surrounding attractions. Even those not in the market for a place to buy or rent will notice a floodlighted place and report to friends and acquaint-

Classification of Outdoor Lighting Market

Utilitarian Lighting
- Loading Platforms
- Parking Areas
- Construction Projects
- Outdoor Storage

Light for Selling
- Filling Stations
- Beer Gardens
- Eating Places
- Golf Driving Ranges
- Tourist Camps
- Roadside Stands
- Dance Halls

Recreational Lighting
- Tennis Courts
- Bowling on the Green
- Badminton Courts
- Garden Lighting
- Soft Ball Courts
- Shuffle Boards
- Swimming Pools

Rental Lighting
- Rental Homes
- Vacant Buildings
- Real Estate Offices
- Mortgages Companies

Lighting for Protection
- Alleyways
- Coal Yards
- Poultry Yards
- Storage Yards
- Orchards

ances. Speeding up of the sale or rental of a place will alone pay for the lighting many times over.

When outdoor lighting is mentioned, we perhaps think of lighting for recreation. Perhaps because it is the most interesting to a large group of people. Football and baseball at night have been made practicable by the development of equipment for the purpose and the low cost of electricity, thus demonstrating that it is feasible to illuminate smaller areas for other outdoor sports.

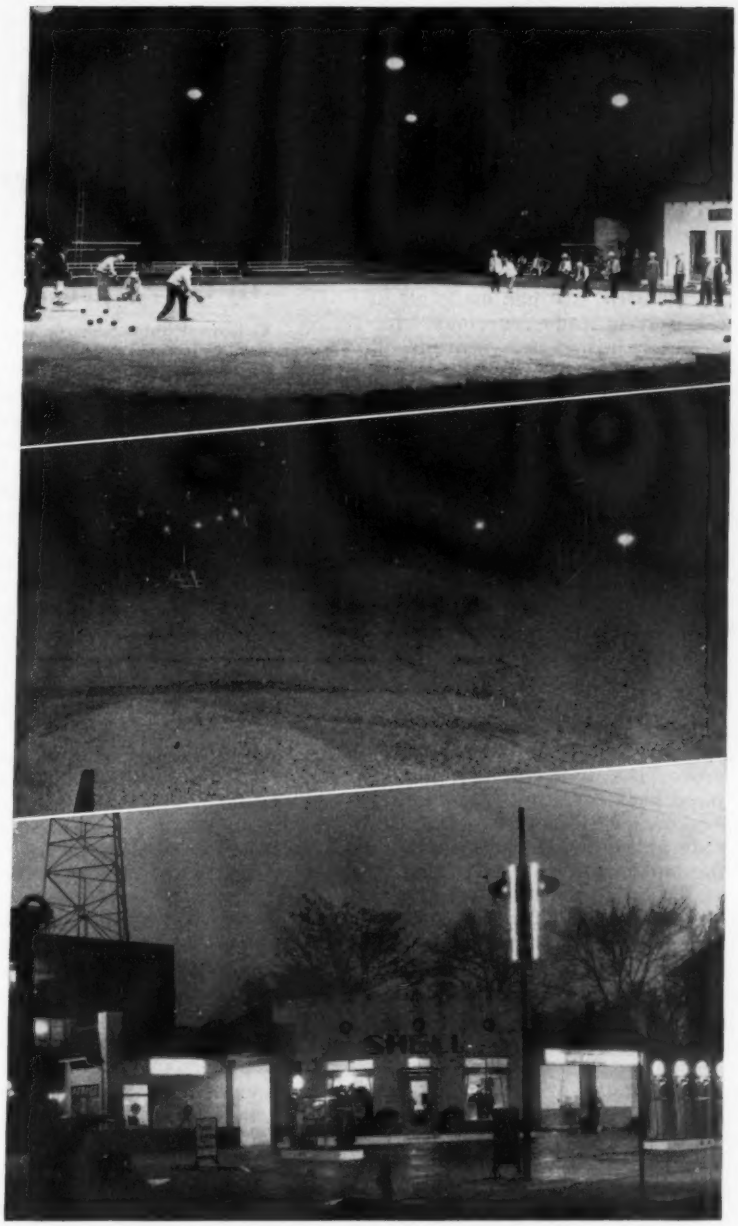
Each season sees the addition of more lighted football and baseball fields, but since all contractors cannot work on the same large project in their community there is no reason why lighting prospects should not be developed for tennis courts, badminton courts, shuffleboard and similar recreational areas. There are no doubt many unlighted sports areas in each community the owners of which can be sold when shown the advantages and pleasure that lighting will bring.

Protective Lighting

Protective lighting perhaps can be classified as ultilitarian lighting but the advantage of outdoor lighting as a guard against theft and marauders are so many and constitute such powerful sales weapons that it may be worthwhile to consider it separately. Anyway, the chief value of classifying outdoorlighting is to assist in more effectively lining up the sales advantages and that our thinking may be more clear in approaching the sales problem.

In this field as in outdoor lighting for selling, lighting is again the most economical and effective agency. Crime avoids light. Light is an untiring watchman unaffected by temperature or weather, can be present in every section of the yard at once at wages less than those of a Chinese coolie.

There are hundreds of garages housing the family car that are yet unlighted; thousands of homes are prospects for lights under the eaves at all corners of the house controlled by switches at the master's bed and at the front door; light protects the vegetable garden and poultry shed from theft; industrial and commercial places can have protection with light at low cost, where there are now watchmen on duty light will assist them to more effectively perform their duty and, in addition, safeguard themselves—the list can be extended indefinitely.



The possibilities for sales in the outdoor lighting field are almost unlimited. Here are a few typical examples taken at random. Above, a bowling green; at center, a large coal yard lighted for protection; and below, a filling station.

Outdoor lighting can be developed into a profitable business for the contractor who is willing to work. As in all fields, the contractor must put forth selling effort. Here is a field relatively free from difficult competition that will assure a reasonable profit. The contacts gained will unquestionably open up new avenues for other business.

We have many experiences to substantiate the fact that the public is in a receptive mood toward outdoor lighting. The manufacturers have provided a large variety of equipment for all outdoor lighting applications. The sales arguments are logical and convincing, and the fear of high operating costs has been dispelled from the minds of most customers.

Understanding and Using the National Electrical Code

By B. Z. Segall

New Orleans Public Service, Inc.
New Orleans, Louisiana

ARTICLE 210 has made all of us very code conscious. Immediately after its appearance it caused more discussion, it was more misunderstood, and it was more misinterpreted than any other set of code rules.

Before going into a detailed discussion of this section, it is well to bear in mind one important fact. All the rules are developed for minimum requirements. Many installations should have more outlets, than are required by the code. The use of larger wires, many times, proves to be a much more economical job than the installation of the minimum sizes of wire allowed by the code. One extra switch, properly placed may save a broken leg, or bruised arm, or injured back resulting from "switch exploration" in a dark room. The code provides the tools for building up a safe and sufficient installation for average conditions. The engineering for any installation has to be supplied by the consultant or the contractor.

Branch Circuit Design

The question of proper engineering definitely comes up when the design of the branch circuits are being considered. For example a 15 ampere branch circuit requires No. 14 wire as a minimum size. However a No. 14 wire branch circuit extending 20 feet to the first outlet is one thing and the same size circuit extending 80 feet to the first outlet is another thing. It must be kept in mind that every ampere flowing in a piece of wire heats that wire due to its resistance. Reactance (inductive effect) also plays a part but for the purpose of this discussion it may be ignored. This loss shows up as a voltage drop and in effect is a definite measure of the efficiency of any wiring system.

We have all seen the figures of lamp efficiency at varying voltages. But we seem to lose sight of their significance as readily as we obtain them. Repetition of these facts, therefore, will not be a waste of time. A two hundred watt lamp rated at 120 volts will produce its full light and consume 200 watts of energy if operated at 120 volts. Reduce the voltage to the lamp say five per cent or six volts and we now have 114 volts applied to the lamp. Our lamp, true enough is using less energy, only 92.3% of the rated wattage. Our light output, however, is not in proportion to the wattage reduction, i.e., 7.7% less, but actually is 16% less. We are obtaining only 84% of the light we had with 120 volts on the lamps. And many installations operate today under such conditions.

Actual tests on other appliances show similar results. A 5% reduction below the rated voltage of a waffle iron, percolator, or other heating devices will reduce the heating of these devices by about 10%. This means that 15% more time is required to brown the waffle, 20% more time is needed to heat and percolate coffee properly. This means that our kilowatt hours, and therefore our ultimate costs, have increased, not in proportion but from about 6% to 10%.

Reduced voltage affects the sensitivity of our radio sets, and lessens our enjoyment of programs. Reduced voltage decreases the effectiveness of our sun lamps. Reduced voltage increases the cleaning time of our vacuum cleaners. Reduced voltage is the factor which makes for the greater inefficiency in our electrical systems.

Let us now follow through the example of the 20 foot and 80 foot branch circuits. Figure 8 shows a simple two wire branch circuit consisting of two No. 14 wires supplying a lighting load.

IN this fourth article of his series on the Code, Mr. Segall begins a discussion of Article 210. So much interest has been exhibited in this part of the Code and its scope is so great that several installments in this series will be devoted to this single article. These will follow in the August aud September issues.

Example of Calculation

The average resistance of No. 14 wire is about 2.5 ohms per 1000 feet of wire. Assuming the circuit is loaded to 15 amperes let us take our first example of 20 feet distance between the first outlet and the distribution cabinet and calculate the voltage to the first outlet. For a circuit as shown by Figure 8, the voltage at the first outlet would be equal to the voltage at the distribution cabinet less the voltage drops in the two lines "a" and "n".

The volts drop in each line is equal to the resistance of each line multiplied by the current in the line.

Resistance of each line = resistance per 1000 feet × (length of line/1000) = 2.5 × 20/1000 = .05 ohms.

The total resistance to first outlet = 2 × .05 = .1 ohm since we have two lines serving outlets. The voltage to the first outlet is therefore = 120 — 15 × .1 = 120 — 1.5 = 118.5 volts.

For the 80 foot circuit the voltage at the first outlet = 120 — 2 × 2.5 × (80/1000) × 15 = 120 — 6 = 114 volts. In the first case we have reduced the light output by only 4% but in the second case, by 16%.

Suppose we had used a No. 12 wire in the 80 foot run. The resistance of No. 12 wire averages about 1.5 ohms per 1000 feet. Our voltage at the first outlet would be = 120 — 2 × 1.5 × (80/1000) × 15 = 120 — 3.4 = 116.6 volts. The light output is now reduced by 9%. A further increase to No.

10 wire would reduce the drop to 2.4 volts and the light output to 6.5%.

To carry the illustration a little further let us consider small three phase motors connected to a comparable circuit. Figure 9 is a diagram of such a circuit.

The voltage drop in each line for a No. 14 wire, 20 feet distance, and 15 ampere full loading = 2.5 × (20/1000) × 15 = .75 volts. This represents the drop to a hypothetical neutral. The drop with reference to the voltage across any two terminals of the motor at the first outlet is found by multiplying this "voltage drop to neutral" by 1.73. Therefore, the voltage across the terminals at the first outlet = 240 — (1.73 × .75) = 240 — 1.3 = 238.7 volts.

For the 80 foot circuit the voltage drop to neutral = 2.5 × (80/1000) × 15 = 3.0 volts, and the voltage across the motor terminals = 240 — (1.73 × 3) = 240 — 5.2 = 234.8 volts.

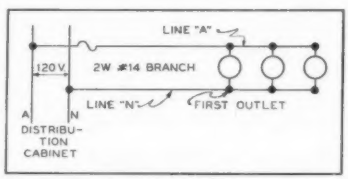


Fig. 8. A simple, No. 14, two-wire branch circuit supplying a lighting load.

The significant factor in the above discussion is that each and every contractor, inspector, wholesaler, in fact all of us in the industry, will have to change our viewpoint and approach in the selling of wiring installations. The various industry campaigns such as "Electrical Refrigeration" in 1931, "Better Light—Better Sight" in 1933, "Modern Kitchen" in 1935 and the present "Adequate Wiring" are making everyone very conscious of the electrical system in their home. This adequacy campaigning is being carried on in newspapers, on the radio, and in magazine articles. The housewife is becoming most conscious of the many things electricity can do for her.

In the past a home owner boasted of his extra bathroom, or his new recreation room, or his special washable wall paper. We are now beginning to hear, occasionally, of that extra circuit in the kitchen for the toaster, iron and refrigeration. Here and there

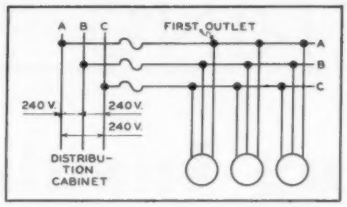


Fig. 9. Typical three-wire, three-phase branch circuit supplying small motor load.

a new home owner will boast of the special switched baseboard outlets in the living room. Every so often we find specifications demanding three-way and four-way switching.

All these requirements, these adequate electrical provisions, are becoming more and more in demand by every home builder. The demands for adequate wiring are gaining momentum. More questions on adequate wiring are being asked. The time is fast approaching when it will not be possible to sell the future home builder an electrical installation by telling him how he can save on his electrical work. He will want to know how his comforts and needs can best be served by his electrical servants. Those of us who can tell him most and tell him best will have the benefit of his confidence and of course his business.

And what has all this to do with the National Electrical Code? It has a very definite effect on its requirements. It has given us a 1937 code which is very much different than any code we have ever had. This 1937 code has made some very definite steps for adequacy. Branch circuits for the home are being calculated on a wattage basis double that required for the main service feeders. This code for the first time sets up a standard for minimum requirements on receptacles.

Greater Capacity Sought

All this is but a beginning. The I.A.E.I. is submittting to the Electrical Committee, among other proposed changes for the 1940 code, some very positive contributions to the cause of creating adequacy in our homes. Instead of two watts per square foot, the inspector is now asking for three watts. Instead of just asking for ample outlets in the kitchen, pantry, dining room or breakfast room, he is asking that these outlets be isolated from all other outlets and installed on a separate circuit.

Not only is he asking that these outlets be installed on a separate circuit but he is asking that a minimum of No. 12 wire be required for these circuits. Instead of a 1000 watt appliance load he is asking for a minimum of 2000 watts. All these changes are but an attempt to keep up with the growing demand by the consumer for enough outlets, for enough switches, for enough wiring in his home.

Let us therefore keep these things in mind in using the code. It is not an engineering manual. It is but a definite minimum standard. At all times use it to give the customer a wiring system which will insure him the most efficient use of all his equipment. In other words temper the code rulings with a little engineering on your own part. Sell him his wiring as the plumber has the square bath tub and the multi-colored wash basin. Sell him his wiring as the wall paper man has sold him on washable paper. We have a facility that has a much greater demand factor of use than any one of these. We can impress the home owner of this fact if we only try.

New Orleans Campaign

(*Continued from page* 12)

tact calls at residences during the year, stressing the use of various appliances and services as well as their low cost of operation, rather than specialize on the merits of a particular product. Leads obtained by all employes of the company will be turned over to dealers. Representatives of the company are paid the same compensation when a dealer makes a sale as when he makes it for the company.

The prospectus estimated sales of local dealers would total 14,775 this year, compared with 11,532 in 1938 and cited the fact that the saturation point for refrigerators is 44.6 per cent in New Orleans, compared with a national average of 50 per cent; attic fans, 1.1 per cent in New Orleans; and that other appliances were similarly low in proportion to the potential market.

The prospectus indicated a potential market for millions of dollars worth of new electrical appliances for residences and commercial places in New Orleans.

ENGINEERING SECTION

Interpreting Insulation Resistance Measurements

By Graham L. Moses

Insulation Engineer
Westinghouse Elec. & Mfg. Co.

INSULATION resistance measurements are widely used to determine the relative condition of insulation on electrical machinery. In order to properly interpret these relative values there are several significant factors that must be considered. While these factors are few, they are important and unless considered in interpreting insulation resistance values the results may appear to be inconsistent.

Electrical insulation is a most remarkable property of matter. No other property varies so widely from one material to another. To use two conventional materials as illustrations copper has a resistivity of .00000067879 ohms per inch cube whereas mica has 3 to 50 million megohms resistivity per inch cube. Therefore the relative insulation resistance of mica as compared to copper is approximately one billion multiplied by ten billion.

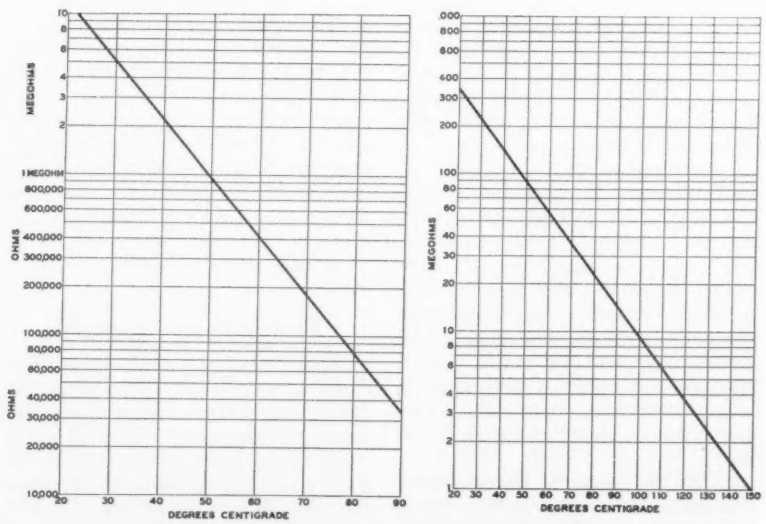
However poor a conductor insulation may be it is important to remember that it is slightly conducting. For this reason insulation in general is sometimes classified as "second class conductors." The particular way in which insulation, or second class conductors differ from metals is in the effect of temperature on resistance. First class conductors increase slowly in resistance as temperature increases, whereas, second class conductors decrease rapidly as temperature increases. Different insulating materials change their resistance at varying rates with changes in temperature, but all follow the general trend decreasing rapidly as the temperature increases.

The curve in Fig. 1 shows a typical curve of insulation resistance plotted against temperature for an induction motor with Class A insulation. Fig. No. 2 shows a railway motor with Class B insulation. From this it is apparent that insulation resistance changes greatly with temperature. Therefore, unless the temperature is known as well as the insulation resistance, the latter is not comparable and is of little or no practical value.

In order to use insulation resistance measurements on a particular machine as an indication of insulation condition, they must all be made at the same temperature or a common basis for temperature comparison made. Because even a small difference in temperature produces a great variation in insulation resistance, it is desirable to establish a curve of insulation resistance against temperature. This should be done on a typical machine which is known to be in good condition and thoroughly dry.

Insulation resistance measurements should then be taken at several different temperatures and a curve made such as Fig. 1. This establishes the slope of the curve. Drawn on "semi-log" paper this should be a straight line. Safe upper and lower limits then can be drawn as parallel curves. It is very important to take insulation resistance measurements at a time when moisture conditions are stable. Tests should not be made while the apparatus is being dried out as the data would have no comparative value due to the presence of this undetermined factor.

From a large number of tests it has been observed that Class A insulation decreases 56% in insulation resistance when its temperature increases 10° C. This is



The marked variation in insulation resistance with temperature is demonstrated in these curves. The curve at the left shows insulation resistance of motor insulated with "Class A" insulation for various temperatures. Curve at right shows similar data for motor insulated with "Class B" insulation.

a constant percentage (not a constant numerical value) as for each 10° C. change in temperature it must be calculated on a new base. Class B insulation, which includes mica, decreases only 37% for each 10° C. change. This relation is expressed by the following formula.

$$R = rC^n$$

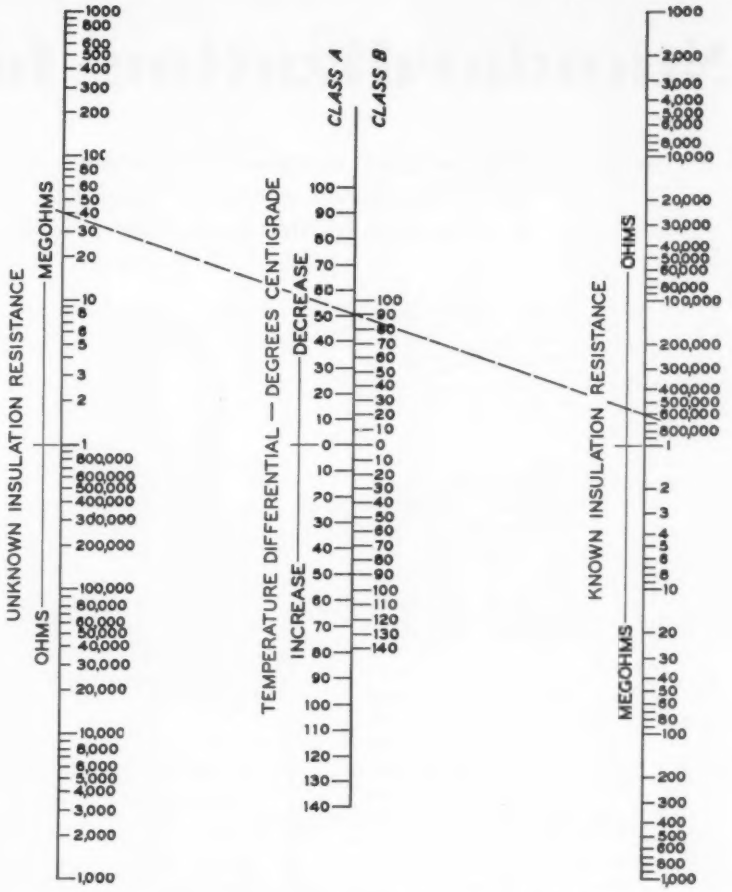
Where:

R = Insulation resistance at higher temperature T° Centigrade.
r = Insulation resistance at lower temperature t° Centigrade.
C = Constant: For Class A Insulation, .44; For Class B Insulation, .63.
n = Exponent: (T°—t°)/10.

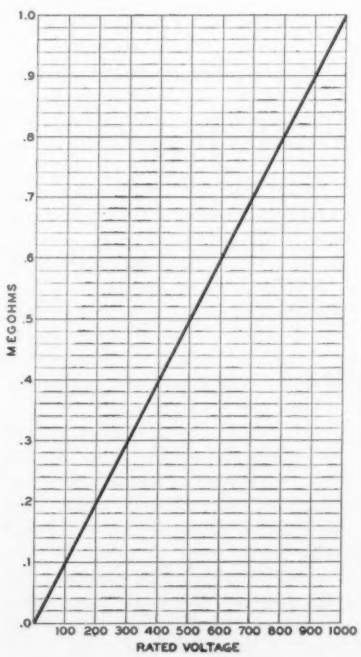
For example, a motor such as shown in Fig. 1 has an insulation resistance of 11.7 megohms (r) at 20° C. To find its insulation resistance (R) at 50° C.

$R = rC^n = 11.7 \times (.44)^3 = 1$ Megohm, because
$n = (T°—t°)/10 = (50—20)/10 = 3$

Since this involves some calculations which cannot quickly be performed mentally, a curve has been devised to express the relation between insulation resistance and temperature. From this curve Fig. No. 3 it is possible to quickly solve this problem graphically.



Insulation resistance measurements made at one temperature may be converted to equivalent resistance at some other temperature through the use of this chart.



This curve shows the expected insulation resistance of clean, dry motors and generators of 1000 kva or less at 75° C.

For example a value of 600,000 ohms insulation resistance at 120° C. can be quickly corrected to 30° C. The procedure involved is to subtract the two temperatures obtaining the temperature *differential.* Next lay a straight edge on the curve which passes through 600,000 on the right hand index and 90° on the Class B center index (in the decrease or minus direction). This straight edge will then intersect the left hand index at 40 megohms which is the insulation resistance of the machine in question at 30° C., or at a temperature decrease of 90° from the temperature at which the 600,000 ohm insulation resistance value was observed.

The American Institute of Electrical Engineers recommends that the insulation resistance of stator windings and armatures of clean, dry machines at approximately 75° C. should not usually be less than given by the formula:

$$\text{Insulation resistance in megohms} = \frac{\text{Rated voltage of machine}}{\frac{\text{Rating in Kv-a.} + 1000}{100}}$$

The minimum insulation resistance of the field should be of the order of one-half to one megohm, depending on the size of the machine. The rather general practice of insurance companies is to demand an insulation resistance of one megohm per 1000 volts operating voltage, with a minimum of one megohm, for apparatus that is insured.

Curve Fig. 4 shows graphically the insulation resistance values recommended as minimum by the A.I.E.E. under this formula at 75° C. The form of this formula is such that in the smaller ratings, voltage is the principal factor.

There are four generally used methods of measuring insulation resistance as follows:

(*Contniued on page* 23)

Standardization for Utilities

The lack of standardized construction and operating methods among electrical light and power companies is discussed by this well known utility commissioner.

SEVERAL years ago I wrote several articles concerning the benefits of standardization of the rules, methods, practices, material, equipment and other matters pertaining to steam railroading. It brought down upon my head a storm of protest from certain railroad interests and a number of letters from very prominent railroad presidents telling me how radically wrong I was. However, since then I have been very gratified to notice that a national committee of the American Association of Railroads has been formed for the very purposes and objectives for which I recommended the creation of just such an organization. I also notice quite a little pride exhibited by the railroad industry in the fact that it now has such a working organization.

So again I "stick my neck out" —this time to be shot at by the electrical industry. The purpose of what is to follow is similar to the purpose embodied in my railroad standardization articles; that is, uniformity, economy, simplification, better trained employees, less left to chance, nothing done except that required, assurance of best service at lowest possible cost, reduction in materials and supplies on hand, in parts and equipment required, and related matters.

Company Practices Differ

If you were in charge of erecting an electric power pole line I dare say the method you employed would differ from those of some other foreman, working for another electric company, erecting an identical type of pole line, even though conditions were precisely the same. And that difference would be due in part to the previous training of each of you.

Obviously, there is but one logical, correct, and most efficient and economical method of doing such work. All others are bound to be less logical, less correct, less efficient and less economical.

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By Riley E. Elgen
Washington, D. C.

Yet there are no instructions available having universal application to all electric utility companies. Each individual company with few exceptions depends upon its own men in the field to use the one logical, correct, most efficient and most economical method of doing all kinds of work.

Here lies a vast unexplored field of opportunity for the electric light and power industry; an opportunity for saving money, for saving time and for benefitting public relations.

Sometime ago I talked with the president of one of the most successful operating electric light and power companies in America—successfully operated from the point of view of both the public and the owners. He was discussing informally his reasons for not purchasing a competing power property which the public was asking him to buy. He said, "Why, if we bought that property, we would have to spend thousands of dollars to bring its construction up to *our standards. We could not guarantee to furnish continuous service over any such shoddily constructed transmission and distribution system . . .*"

I have before me two volumes, each about two inches thick. They are the specifications for doing any kind of construction or repair work to be found in the telephone industry anywhere in the United States. They are not new. The idea is not new. They are the specifications of the American Telephone and Telegraph Company. These are gotten out in loose-leaf form and are kept up to date. These instructions of the A. T. & T. are issued telling how to do nearly every kind of a job of construction, repair and maintenance that can possibly occur.

A. T. & T. Co. Standards

These volumes contain diagrams, pictures, sketches and like forms of visualization of the accompanying instructions for doing work of all kinds. They contain the proper methods and procedure for doing all kinds of jobs, such as attaching a guy wire to a telephone pole, unloading, storing, hauling and erecting poles, stringing wires, placing transformers, digging telephone pole holes, placing all kinds of cables, either on poles or in underground construction. In fact, if your electrical foreman were working on a telephone construction job he would find his work greatly simplified. He would soon discover that instead of keeping his own plans in his head, each trained man working for him would be almost as well acquainted with the processes of doing the work as he.

Your electrical foreman might move on to Maine, Florida, Minnesota, California, Washington or any other state and he would find other foremen working other gangs composed of exactly the same number of men he had for doing exactly the same character of work in exactly the same manner, with the identical kind, character and number of tools. Yes, the work of the American Telephone and Telegraph Company is performed in precisely the same

COLT NEWS

COLT ANNOUNCES THEIR NEW MULTI-BREAKER LOAD CENTERS

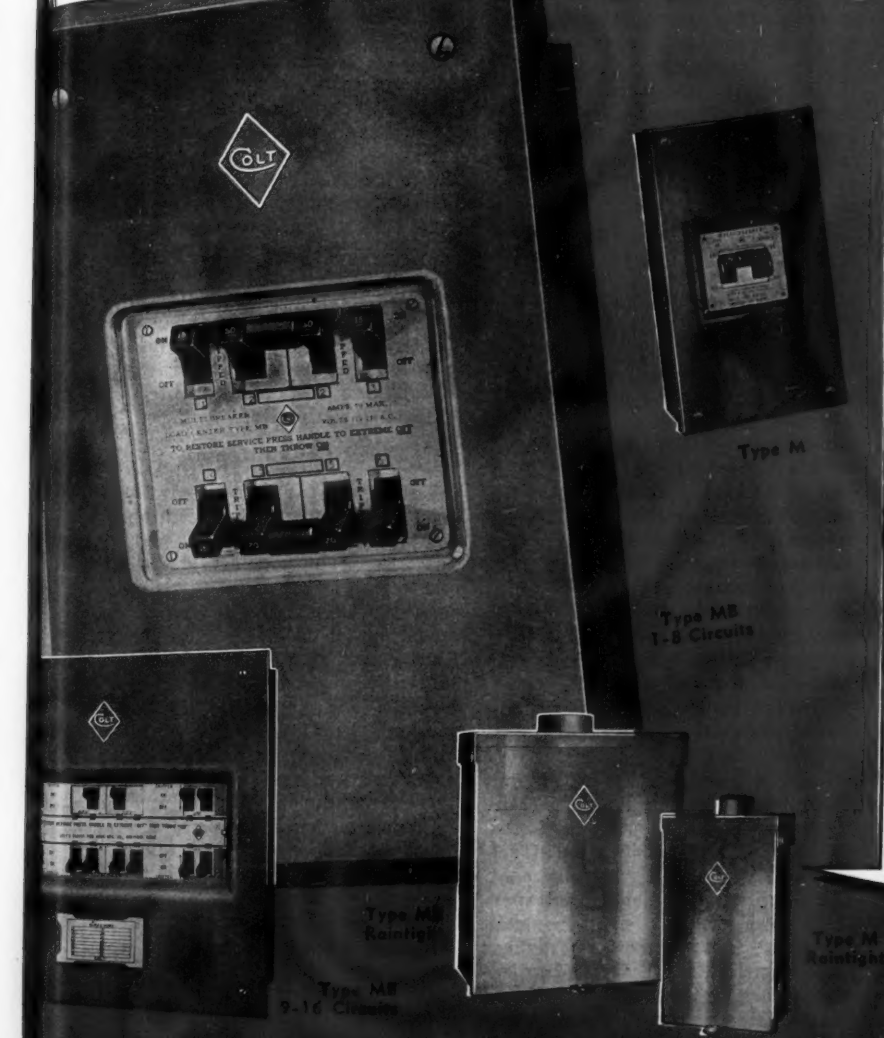
Famous Electrical Line Now Includes Latest Home Protective Devices

Right up to the minute is this new Colt line of protective devices . . . the Colt Multi-Breaker. Modern homemakers demand finger-tip control of lighting circuits, electrical appliance, refrigerator and range circuits. That's exactly what the Colt Multi-Breaker provides . . . quick, handy, efficient "on" and "off" control for every circuit in the home. Attractive cabinets and smart, moulded jet-black handles harmonize with today's kitchens . . . add a touch of efficiency to every home.

The simplicity of the Colt Multi-Breaker will appeal to your customers . . . especially the women. Absolutely safe . . . completely automatic.

the Modern Way

TO PROTECT A MODERN HOME



Complete Line of Types M..MB..MBM Now Ready

Available for 1 to 16 Circuits

Breaker Ratings 15 to 50 Amperes

New and bigger sales . . . an entirely new field opens up for you with the new Colt Multi-Breaker. The modern home builder knows what he wants in the way of electrical equipment . . . and he wants automatic, finger-tip control of his home circuits. That means he wants Colt Multi-Breaker . . . and that means bigger sales, more profits for you. These new Colt devices are as modern as tomorrow. The line is complete . . . ranging from the compact type "M" up to the sixteen circuit type "MB" and the combinations known as type "MBM".

EASY TO SELL... and EASY to Install

Nothing could be simpler than these new Colt Multi-Breakers. Simple in design . . . easy to explain to prospects . . . quick to install . . . attractive in appearance. Their features will sell them almost on sight.

Yes Sir! I want full data on y NEW COLT MULTI-BREAK Send detailed information an models, including prices.

COMPANY_____

ST. & NO._____ STATE_____

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COLT'S PATENT FIRE ARMS MFG. CO
Electrical Division Hartford

COLT *Multi-Breaker*
LOAD CENTERS

manner no matter where it may be done. So much for workmanship of field construction and maintenance operations; "Yes, but how about materials?" you say. Well the field specifications that so clearly depict in the most minute detail the steps essential to doing all kinds of work also give the kind and character of materials and supplies entering into the work to be performed. Nothing is left to the imagination of anyone.

Did I say nothing? Well, as a matter of fact, if any employee, foreman, laborer, superintendent or other official finds better, more efficient and more economical ways and means of achieving the results sought, they are at liberty to suggest to the A. T. & T. Co. changes in existing rules and specifications.

Oh yes, I know it is not so simple for a lot of unrelated electric companies to put such a system in operation. I know too that in times not long past electric companies might have been regarded with suspicion if they had joined together for common defense against waste. On the other hand, progress in the standardization of materials used in electrical construction has been achieved. There are quite definite attainments in that direction, but nothing like what is found in the telephone industry.

Several of the best known chief engineers of operating electric light and power companies admitted that, even within their own individual company organizations, there were no existing instructions comparable to those of the A. T. & T. Co. Those contacted admitted that the ability of the individual foremen was relied upon rather heavily to produce a satisfactory quality of workmanship.

The American Standards Association is a real live organization and doing quite a good job of trying to standardize industry in general. Its board of directors is comprised of leaders in industrial activities in the nation. Included are prominent technicians from many well known organizations such as Lyman J. Briggs, Director of National Bureau of Standards, H. P. Charlesworth of the A. T. & T. technical staff, C. L. Collens of the National Electrical Mfgrs. Assn., F. W. Farmer of Electrical Testing Laboratories, John C. Parker of A. S. A. Electric Light and Power Group, and many others connected with the manufacturing of tools, machines, pipes and the like. There are also men prominent in insurance, railroads, petroleum, chemical, automobile and other fields.

ASA Work Effective

The A. S. A. is, in fact, a federation of national associations and government departments. Industrial, technical and governmental groups develop and coordinate their standardization programs through the facilities afforded by the A. S. A. It originated in 1918 through the desire of five of the principal national engineering societies to create a clearing house for their standardization activities. Since then it has been reorganized (1928) and its activities extended until at present they comprehend the whole gamut of our industrial machinery. Its membership includes 75 national organizations and more than 2,000 companies. Membership in the A. S. A. is open to any industrial, commercial, technical or governmental group concerned with standardization work.

So it can be seen that the importance of standardization or simplified practices is recognized in all walks of life and business. Four hundred standard and safety codes have been approved. More than 600 organizations are participating in the work. There are 2,987 men serving on technical committees of these organizations.

The difficulties, as I see, with the A. S. A. is a decided lack of a paid working staff of research experts. Instead of spending perhaps ten or twenty or fifty million dollars annually, it has only around $100,000. Little can be achieved in relation to what is to be done unless greater resources and paid men are available.

There appears an increasing recognition of the benefits to be attained through standardization of all kinds of work, materials and supplies. The soundness of the principle is no longer questioned. It is admitted that it is an effective instrument of management. Through standardization all parties to a trade are on common ground, thus promoting fairness in competition. By standardization mass production is achieved with its attendant reduced costs of production, simplifying carrying of stocks and the speeding up of deliveries at lower prices.

The tests applied to the setting up of a standard are: (1) will it bring about substantial economies; (2) favorably affect operations; (3) add to safety of persons and property.

It is recognized that to some degree or other each operating electric light and power company has set up some standards. It would look like a relatively simple process to collect together, classify and study these existing standards. This is the point of beginning of any program of standardization. Unquestionably a study of all operating electric companies' rules, methods, practices, materials and supplies would develop some better standards for some. Then too, materials, supplies, plants, and machinery and the like used by the electric light and power industry come from many manufacturers so that if simplification is proceeded logically it becomes necessary to engage the cooperation of allied industry —those who make what the electric light and power industry uses.

In fact, for standardization to proceed logically in nearly any phase of industry there must be close cooperation between the industry to be standardized and those who make what it uses in its business. So simplified practice is not so simple as it sounds. These conditions make it necessary for rather wide recognition of the true value to be obtained from such activities.

Need for Uniformity

There is a serious need for a greater measure of uniformity in all phases of the electric utility business. That is perfectly obvious to anyone reading the proceedings of various electric technical societies or associations. These discussions of problems by members of these organizations clearly show a wide variation in rules, methods, materials, and other things entering into plant construction and maintenance.

The standardization of any industry is a continuous process—a never ending task. Because of obsolescence, advance in the art, invention and the like, there can be no such a thing as a completely modern industrial plant. When you discover a completely modernized industry you have found a decadent one. And too, it is hardly economical, just for the purpose of simplification, to throw away all obsolete equipment and install new and modern.

Out of a total of about 400 industrial standards adopted so far by A. S. A. or in process of discussion, about 66, or 16½ per cent, of these cover practices, materials, supplies and equipment related in some direct way to the electrical industry.

There is an active but unpaid Electrical Standards Committee. It is composed of all the interested groups such as: American Institute of Electrical Engineers, American Society for Testing Materials, Electric Light and Power Group, National Electrical Mfgrs. Assn., and many others. Their work is very commendable, but what is needed is a completely separate and distinct group of the highest quality of highly-paid electrical research experts, such as you find in a similar organization of the A. T. & T. Perhaps 5, 10 or 15 million dollars could be devoted nationally with profit to the subject of standardization of the electrical utilities.

Perhaps one of the most comprehensive papers on this subject is a discussion of "The Standardization Work of the Detroit Edison Company" by F. M. Price of that company. That shows that the Detroit Company purchases more than 65,000 different articles for use in its work of construction, maintenance and operation. These cost around 25 million dollars annually. More than 12,000 different items are regularly carried in stock. The Accounting Department of the Detroit Company maintains individual accounts of the money invested in the stock of each item, involved inventories and an elaborate requisitioning system requiring the use monthly of 32,000 requisitions and 75,000 Hollerith cards.

The need of standardization appears upon examination of stocks of materials and replacement parts, and is reflected in increased capital invested. Excessive handling charges are the criteria of this condition, as well as a tendency to actually increase the number. Then too, an examination of the records show the slow movement and stagnation of certain items. Thus much time is lost in searching for isolated out-of-use parts. "Private stocks" have a tendency to accumulate because of these conditions. These and many other symptoms are reflected in the material and supply account. Of course, the lack of standardization is not so simple to point out in other respects.

But this subject is too great, too important, too technical to attempt to cover in detail here. The facts investigated plainly show that millions of dollars can be saved annually by modernization through standardization of the electric light and power industry.

Of course there are always those who regard standardization and regimentation as somewhat related. They think in terms of soldiers marching in rhythm. Everyone dressed alike. They envision row houses—homes all of similar construction and the like. Those are not marks of standardization. Perhaps mass production may more easily follow standardization but certainly standardization ought not to be the outgrowth of mass production methods. It should be the result of a study and investigation of the needs of the industry and not a question of how to fit its needs to what is available in machinery, tools, materials, etc.

Maybe the things most essential to the operations of the electric utility may not even be manufactured in the form that standardization requirements dictate. Of course when any part of a plant or of materials and supplies has been approved for general use of the electric light and power industry it may then be placed in mass production with resulting costs at a minimum.

Neither should the standardization concept carry with it any threat or implication as to labor. In fact, as an example of the contrary, in my judgment, backed by a third of a century in transportation fields, had railroad pursued a standardization program through an adequately paid research staff of competent scientists and others, of suitable size, detached from operation and construction work, fewer railroad employees would have lost out because of the gains of competing forms of transportation.

The lack of modernization, the failure to keep obsolescence and inadequacy down to the minimum, the failure on the part of railroads to keep abreast of scientific discovery, invention and arts, in other words, to keep up with the times, has been a costly mistake. But watch the railroads, they have learned their lesson. They are entering upon a modernization through standardization plan that will keep them in the forefront of mass haulers of machinery, materials, products and men. Will the great electric light and power industry learn something from this railroad episode and, taking the cue from the A. T. & T., go forward with a program as completely standardized as possible? I am betting that it will!

Interpreting Insulation Resistance Measurements

(*Continued from page* 19)

1. Wheatstone Bridge method.
2. "Megger" method.
3. Voltmeter method.
4. Volt-ampere method.

Whichever method and test voltage are selected should be used consistently on all other tests for comparative results. For most practical uses Method No. 2 is most convenient and accurate.

Method No. 1 is useful only for resistances of less than 1 megohm. It is undesirable because of the very low test voltage applied which does not simulate operating conditions.

Method No. 2 is reasonably accurate within the limits of the "Megger" scale range. The "Megger" is a very satisfactory portable test outfit which does not require an outside voltage source, and yet applies a sufficiently high voltage to give indications comparable with service conditions, and is direct reading.

Method No. 3 requires an outside d-c voltage source. It consists of taking comparative voltage readings of (1) line volts and (2) differential volts when connected in series with the insulation to be measured across the line.

The following formula applies:

$$R_1 = \frac{R\ (E - E_1)}{E_1}$$

Where:

R_1 = Insulation resistance in ohms
R = Voltmeter resistance
E = Line voltage
E_1 = Voltmeter reading when connected in series with (R_1) insulation across line voltage (E).

Method No. 4 also requires an outside d-c voltage source. It is an excellent method for very accurate readings, but usually confined to laboratory tests. When this is used the following formula applies:

$$R = \frac{V}{A}$$

Where:

R = Insulation resistance in megohms

V = Line voltage

A = Micro-amperes flowing through insulation

In taking insulation resistance readings and recording these for future comparison the following procedure should be followed:—

1. Record temperature of each winding at the time the insulation resistance is observed. Select a spot for placing the thermometer where a reasonably accurate temperature measurement is obtained. Mark this spot on the machine or record it in the test record and be sure that all subsequent measurements are taken at the some spot.

2. Measure and record insulation resistance of each winding separately preferably by methods No. 2, 3 and 4.

3. Indicate the condition of apparatus such as:

(a) Dirty insulation
(b) Oil accumulation
(c) Surface moisture

4. Record approximate humidity conditions at the time, such as "damp," "average," or "dry" atmospheric conditions.

5. Summarize these factors tabulating the observed data.

6. Plot the insulation resistance against temperature on a semi-log curve as described in the foregoing. If this is not convenient correct the insulation resistance values for temperature using the foregoing formula or graphic solution, reducing all values to the same basic temperature.

When such comparative data has been compiled for a particular machine or type of machine, insulation resistance measurements take on a new significance. When the temperature of the machine is coordinated with the insulation resistance the relative condition of the insulation becomes more ap-

Comparative Data Useful

parent. When insulation resistance tests indicate a trend toward lower relative insulation resistance, steps should be taken to correct this condition before the machine fails in service. Low relative resistance indicates deterioration of the insulation, or the presence of moisture and dirt. Any of these conditions are harmful and the safe operation of the machine may be jeopardized at best to shorten its life. When these potential faults are detected in time they may be corrected at minimum cost and delay. The apparatus should be cleaned and dried out and, if possible, dipped and baked to restore the insulation.

When insulation resistance observations are taken regularly and recorded with proper correction for temperature, their comparison to known standards for a particular machine or type of machine will prove an excellent measuring stick of insulation deterioration. Such data will give insulation resistance a new significance and aid materially in reaching the proper decisions regarding insulation maintenance.

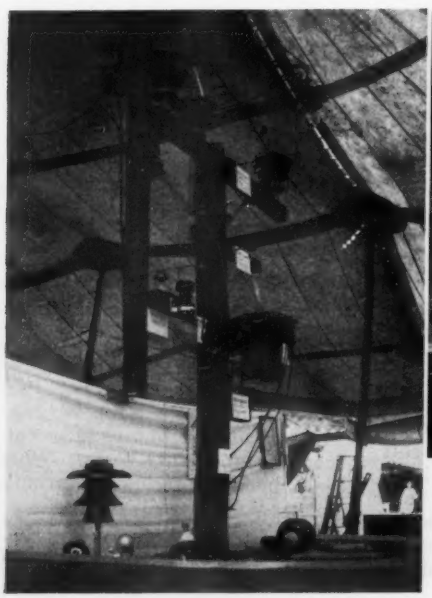
Distribution Equipment Exhibited at Fair

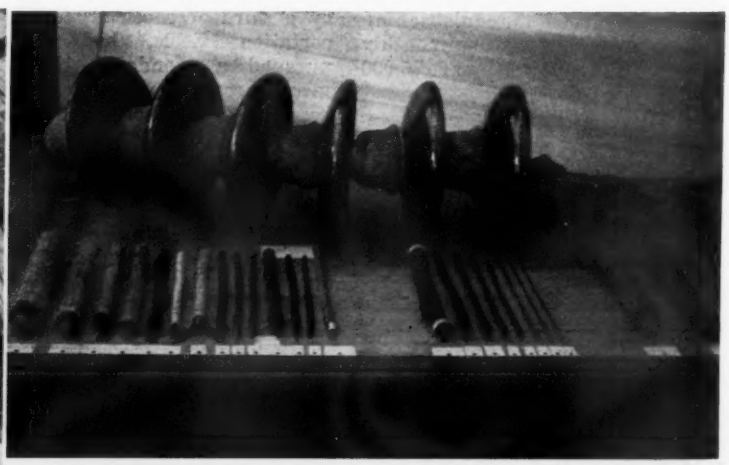
"THE man on the street" has a pretty vague idea about how electric service gets into his house and sets those appliances to work, as everyone knows. Capitalizing on that fact, the Florida Power & Light Company down in Sarasota, Florida, where Ray E. Jackson is the local manager, decided to forego the customary exhibit of appliances at the county fair last month and arrange something different.

When fair visitors came into the tent housing the Florida Power & Light Company exhibit, they were greeted with a booth in which a short "hi-line" pole was set up. On the pole were short lengths of wire, regular insulators, a telephone cross-arm, transformer, secondary and other equipment. On each piece of equipment was a card, giving the name and function of the materials.

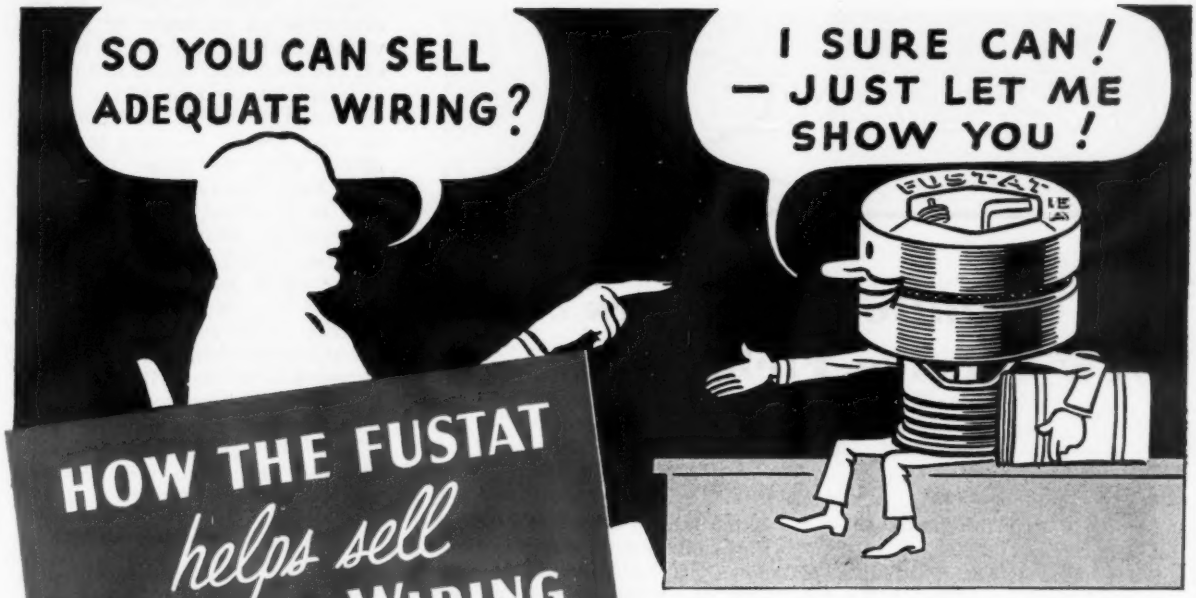
Also in the booth were two table displays. In one group were pole line hardware, connectors and fuses. In another group were mounted on a six foot length of 1 x 12 board short lengths of wire and cables ranging from 750,000 circular mil to No. 8 in size. Also displayed were lead covered, weatherproof, bare, stranded and solid wires. With each piece of material was a card, giving the name and function.

In spite of its technical nature the exhibit attracted much attention throughout fair week.





Ray Jackson, local manager at Sarasota for Florida Power & Light Co., presented county fair visitors recently with an interesting exhibit of equipment necessary to deliver power to the customer. Typical pole line construction was shown as well as displays of hardware items and wire.



HOW THE FUSTAT *helps sell* ADEQUATE WIRING

The Fustat says to users —

"No overloading, please, you'll have to install new circuits"

Users cannot permanently overload a circuit when it is protected by a Fustat of correct size. The Fustat cannot be replaced with a larger size and bridging it in any way is virtually impossible. If additional circuits are needed the user cannot side-step the issue at the sacrifice of safety.

The Fustat says to users —

"Now your toaster, percolator, etc., will always heat up quickly"

The user cannot load the circuit beyond the proper capacity of the copper. This prevents a voltage drop that is so frequently the cause of complaints about toasters, percolators and other appliances not operating efficiently.

The Fustat says to users —

"Now it's perfectly safe to add all the outlets you need"

Since the Fustat guards the circuit wiring against permanent overloading it becomes a perfectly safe practice to add as many convenient outlets to the circuit as are desired.

The Fustat says to users —

"In case of trouble I'll help keep all your circuits from being thrown out of service"

The branch circuit Fustat will almost invariably open on a short-circuit or overload, AHEAD of the main fuse or Fustat — because it cannot be replaced with an over-size fuse nor readily tampered.

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The Fustat says to users —

"I'll prevent many annoying interruptions of electrical service"

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The Fustat helps sell the electrical way of doing things — for it generally permits users to add new appliances without being annoyed by needless blows . . . it assures proper operation of appliances because low-voltage cannot be caused by overloading . . . it reduces chances of users being frightened by shorted cords burning up, for the quick action of the Fustat on dangerous cord shorts — prevents spraying of metal, starting of fires, burning of users . . . it helps teach user that the protective device is a desirable safeguard instead of a nuisance . . . *thus it assists the whole industry to build towards bigger business and better times.*

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APPLIANCE Service

Air Conditioning Offers New Service Field

By Allen Parker

AIR conditioning presents a somewhat different job for the service engineer because of several reasons. First it's a job that might be classed between the automatic job that would run indefinitely without service attention and the job that requires the attention of an operating engineer to give it the constant supervision necessary to obtain good performance.

I believe that better performance and satisfaction will be obtained by the owners if they were sold with the understanding that although the equipment is automatic it is best to have a service engineer check the equipment periodically whether it appears to need it or not during the operating season. Second, it is needless to say that air conditioning equipments should, by all means, begin their season of operation, and close it, under the attention of a service engineer. This is very important, yet the sales staff, in closing the deal, often forget to bring these points out to the customer and he buys under the assumption that a flick of the switch is all that is necessary to change from summer to winter operation.

Another point that might be placed squarely before the service engineer is the fact that he made the installation and knows the service that will be required and should assume the responsibility of advising the customer. He might have made a remote installation with the condensing unit and cooling tower on the roof of the building. A good many such installations have been made and no further attention given them until spring when the owners started operating them. In such cases it is too late to advise the customer that the machine was not pumped down at the close of the season and that some mechanical injury to the tubing controls, etc., has caused a leak and lost the charge of gas worth a good large sum. Or as some very unfortunate cases have occurred when cold weather during the winter froze the water in the condensing unit causing it to burst and filling the system with water to rest in that condition until spring. Such cases happen every year and retard the acceptance of this one phase of the business that promises some day to be outstanding.

Making a General Check

The first spring starting of the system should certainly seem simple especially if the job was pumped down at the close of the season and the water drained from the machine. But a proper start up means more than just turning on the water, opening the valves on the machine and closing the switch. The installation of test gauges on high and low pressure side may indicate that some of the refrigerant has escaped or some other unusual conditions such as erratic expansion valves. Or perhaps if the cooling tower is not functioning properly, you will find the trouble before any damage is done by noting the high head pressure.

Or again, the high head pressure may denote the inert gas that has collected in the condenser from last summer's operation which should be purged off. Or lint, dust and trash may have collected on an air cooled condenser which could be removed with a stiff brush. On the water cooled condenser it might be caused by an accumulation of scale or sludge which should be removed by taking off the condenser heads and using a tube cleaner and water hose. On the other hand, sufficient water may not be reaching the machine with the same resulting high head pressure.

In such events, check the water strainer for sludge and clean it, also the spray nozzles in the water tower which may be corroded or stopped up and, naturally, the position of the water cut off valve should be checked and the handle removed so no one will be closing it during the summer. Also for maximum water cooling efficiency, adjust the water flow properly through the condenser, nozzles and by pass.

Testing Expansion Valves

Assuming that the machine is now in operation, it would be a suitable time to again check the supply of refrigerant, which is simple if you have a sight gauge. If not, use the liquid check gauge, but if refrigerant is not reaching the expansion valves, check the liquid strainer which may need cleaning and make whatever adjustments may be necessary on the expansion valves.

A good method of checking the expansion valve would be to tape a pocket thermometer to the suction line just after it leaves the coil or approximately where the expansion valve bulb is attached to the suction line and compare

Cooling towers should be inspected for fungus growth which may restrict flow in nozzles, etc. A chemical is available which will kill such growth.

the reading of your thermometer with the corresponding suction pressure temperature. The expansion valve should be adjusted to approximately 10 degrees superheat.

If it is not correct, make a small adjustment until you get a proper reading. Even the strainer on the expansion valve may be plugged which should be checked, if one particular expansion valve is not functioning. It is possible one of the expansion valves has become stuck or inoperative during the idle months and may have to be replaced.

All of these checks should be made before a decision is made to add additional refrigerant. Too many service engineers believe that a charge of gas is a "cure all" for all troubles, and so many times use it as the first remedy when a machine doesn't operate properly, with the result that the real trouble is discovered later and the refrigerant charge must be re-adjusted if the machine is to operate at its maximum efficiency.

Although we haven't mentioned it, we all know that everything mechanical in operation needs lubrication and after a long seasonal run air conditioning equipment will be no exception. All the motors including the compressor motor, water pump motors, and fan motors, should have their oil supply replenished or at least be lubricated according to manufacturers' instructions. And although we know that the oil in the compressor is sealed into the system and should be a permanent supply, it would be a good thought at this time to check it as some of it might have been lost through trouble in the past or during repairs.

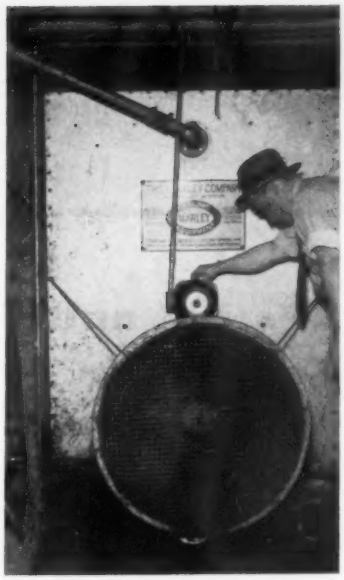
Also, it is possible that the compressor is robbing itself of oil during operation and pumping it to the high side and that a defective oil separator and return would not be detected unless the oil in the crank case was checked. Such a condition existing and not promptly corrected may cause the entire system to be thrown out of operation because of serious damage to the compressor.

Check All Contacts

Why not now be sure that thermostats are not erratic because of pitted or sticking electrical contacts? They can be dressed very nicely with a small piece of "00" (two-naught) sandpaper. Of course the balance of the switches such as pressure controls and magnetic contactors should get their share of this same treatment.

The refrigeration part of the air conditioning installation should now be operating O. K. But for the real service engineer the task is not yet complete. Be sure that plenty of properly conditioned air is available and correctly distributed. The air filters are first in line for checking and should be removed if they are of the cleanable type. They should be thoroughly cleaned and re-sprayed with oil or suitable dust catcher. Of course, if they are not of the cleanable type, they should be replaced. Dirty filters not only fail to cleanse the air, but also act as a restriction to the intake air, reducing the output of the equipment.

After the filters are cleaned or replaced, there is still a possibility of the discharged air not being fresh and sweet. This can more than likely be traced to the cooling coils where dust and other foreign matter has accumulated during the past summer and is in a state of decomposition with resulting bad odors. This can be remedied by using a stiff brush and a solution of strong soda water after which they should be rinsed off and the foreign matter flushed out with a water hose.

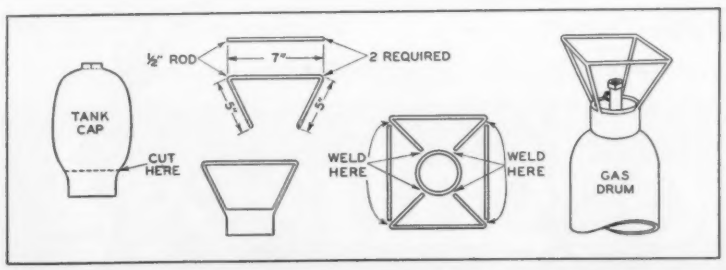


A forced draft cooling tower located in a basement. This installation requires attention so far as oiling the motor, and checking the fan, nozzles, water, etc., at first of the season.

With plenty of good conditioned air, it is time to consider the distribution of it. Eliminate drafts by adjusting the registers or grills for the correct pitch and obtain an even distribution over the allotted space for that particular grill. The dampers in the air duct must be adjusted in order to obtain the correct volume of air for that particular location. A good method of accurately making these adjustments would be to use an anemometer in checking air speeds in cubic feet per minute. A small smoke bomb (that is designed for the purpose) exploded in the discharge duct will instantly show the air currents and distribution from the grills. The grills and dampers in the duct may now need a little individual attention in the final once over to be sure there is no metallic rattles left in them.

Everything has now been checked and the equipment is in good condition but before you leave it, I would use the halide torch and determine positively

(*Continued on page* 46)



Construction details of a combination handle, stand and valve protector for refrigerant drums are shown in the above diagrams. The materials required consist of an old drum cap and approximately four feet of ½-inch round iron rod. The stand permits setting the drum on end for withdrawing refrigerant.

MOTOR Service

Testing and Servicing the Condenser Type Motor

By Jack Beater

A COMPARATIVELY short time ago capacitor, or condenser, motors were practically unknown, yet today they are one of the leading types in the small motor field. This means that all motor shops and motor repairmen are called upon to service ever increasing numbers of condenser motors. Auto mechanics and radio repairmen have had to test and work with condensers from the time they entered the business, but to the motor men it was a radically new device.

To many motor service men the capacitor motor was very much of a mystery when it first appeared. This was to be expected for unless the theory of the condenser is known, the operation of a condenser motor is hard to understand. The purpose of this article is to supply some of this information.

The important function of a condenser is its ability to store electricity. The amount stored and the length of time it can be stored depends upon the size of the condenser and upon how well the condenser is insulated. There are, roughly, three types of condensers. These are the mica insulated flat plate type, the rolled type with dry insulation, and the wet or electrolytic type. The first two types are commonly used in ignition and radio work, while the electrolytic type is used for both radio and electric motor service. Figure 1 shows the general features of the construction of these three types.

Basically, the capacitor motor is a split-phase motor with the condenser added to improve starting performance. An inspection of a typical capacitor-start, induction run motor will show that the two windings are similar in placement to that of an ordinary split-phase motor, but that the starting winding on the condenser motor is wound with much heavier wire. The function of the condenser is to cause a phase lag in the starting winding, and to give the motor starting characteristics approaching that of a two-phase motor.

Tests and repairs on a capacitor motor, other than the condenser, are the same as on motors of other types. It is in testing the condenser that many repairmen have difficulty because of a lack of knowledge on this subject. It is a very simple matter to make the necessary tests on condensers and the only equipment required is an a-c ammeter with a scale reading from 0 to 25 or more amperes.

Condenser troubles may be classified as follows: short circuits, open circuits, loss of capacity, and grounds. If a condenser has a dead short, the motor will not start the load but will run idle if started by hand. If an ammeter is connected in the line it will show a higher than normal reading.

An open circuited condenser prevents the flow of current in the starting winding. This keeps the motor from starting with or without load, but the motor will run if given a start by hand. At this point it must be determined whether the open circuit is really in the condenser or in some defect in the motor switch, such as burned or dirty contacts.

Electrolytic condensers sometimes dry up or otherwise lose capacity and become too weak to start the motor. In such cases, the motor will start when under no load but will stand and hum when the load is connected.

Grounded condensers allow current to leak to the motor frame and, under certain conditions, may cause serious damage to the motor, the equipment with which the motor is used, or to persons using it. To prevent such a condition, most condensers are installed inside a fibre tube or box to insulate them from the condenser cover and motor.

Oil filled condensers are used on condenser start, condenser run motors. The electrolytic type is used for starting, but as the motor gets up to speed the starting condenser is taken out of the circuit, leaving the oil filled, or running, condenser in use. On this type of motor a defective running condenser will cause the motor to slow down after the starting

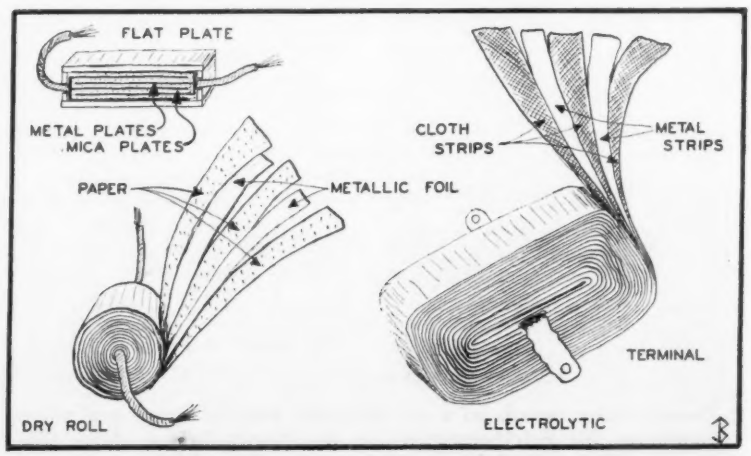


Fig. 1. General features of the construction of three different types of condensers used on capacitor type motors.

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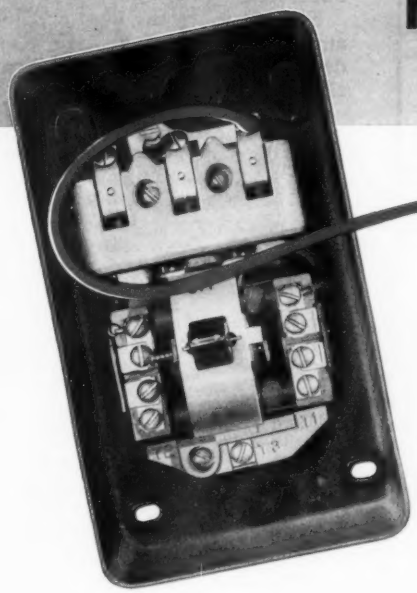

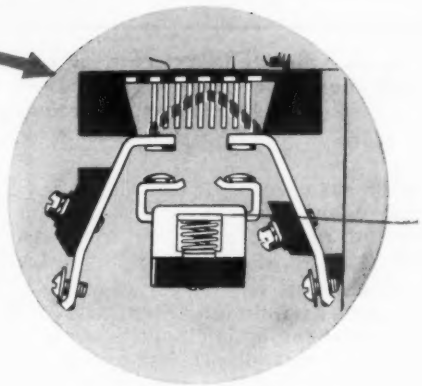

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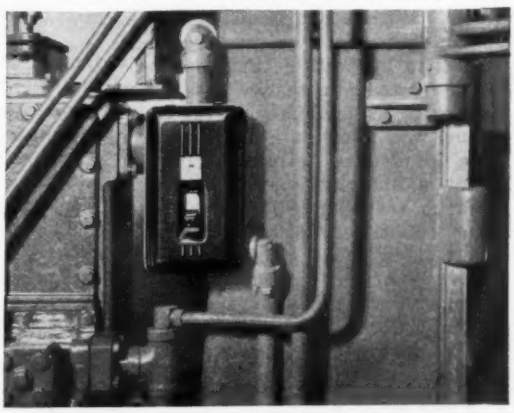

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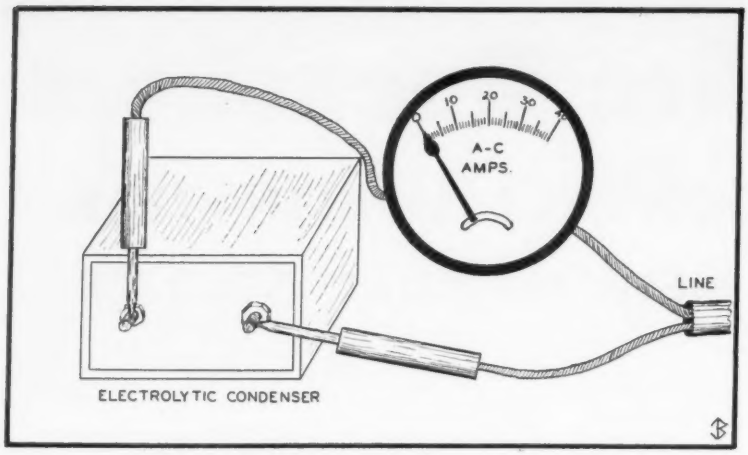

Fig. 2. Simple test circuit for condenser. The 110 volt circuit should be fused slightly above the rated current of the condenser to protect ammeter and operator.

switch has opened. A tendency to heat up and hum are other symptoms of running condenser trouble.

Actual tests on condensers can be made as follows: First, test condenser for open circuit, short circuit or ground with test points and with a lamp or suitable resistance in series. Direct current of the same voltage as the condenser rating is best if available, but alternating current can be used. With a-c it is often necessary to repeat the test several times to be certain that the condenser has had a chance to become charged. After charging the condenser an immediate short across the condenser terminals should show a snapping spark. The fact that a test lamp lights through the condenser is no indication that it is short circuited. Condensers of the capacity used in motor starting will normally pass enough current to light up a lamp of high wattage. Therefore the capacity test is the only safe one to use in checking for shorts.

A good condenser can be placed across the line for a few seconds at a time, as we shall see later, but this should not be tried until it is definitely known that the condenser is not short circuited. Open circuits in condensers are easily identified by the fact that no current will pass through. Grounds are tested by placing one test point on first one terminal and then the other, while the other test point makes good metal to metal contact with the condenser can.

The second series of tests have to do with the efficiency of the condenser; the present capacity in relation to the original capacity. A condenser with an original rating of 115 mfd., for example, can not be expected to give good starting service when the capacity falls to, say, 75 mfd.

There are two simple ways of checking up on condenser capacity. One method, recommended by one of the manufacturers of electrolytic condensers for motor use, is used with the condenser removed or disconnected from the motor. The other method, described in a bulletin published by a manufacturer of condenser motors, tests the condenser while it is operating in the motor circuit.

Figure 2 shows how to make tests by the first method. With an ammeter in the line apply 110 volts a-c, directly to the condenser terminals. The line should be fused a little above the maximum amperage for the particular condenser to be tested (as shown in following table) so that a dead short in the condenser will blow the fuse. Shorted condensers have been known to explode with considerable force when placed on an unprotected line.

Following are the high and low amperages for electrolytic condensers of the different capacities:

Capacitor MFD	Minimum Amperage	Maximum Amperage
10	.4	.5
20	.8	1.0
30	1.2	1.5
40	1.6	2.0
50	2.0	2.5
60	2.4	3.0
70	2.8	3.5
80	3.1	4.0
100	3.9	5.0
115	4.5	5.7
135	5.1	6.7
150	5.9	7.5
175	6.8	8.7
200	7.9	10.0
250	9.9	12.4
300	11.8	14.9
400	15.7	19.9
500	19.6	24.9
600	23.6	29.9
700	27.6	34.8
800	31.4	39.8
1000	38.9	49.8

The second method of measuring condenser capacity requires, in most cases, the opening of the motor to get at the starting winding terminal and disconnecting it so as to connect the ammeter in series for the test. Figure 3 shows just where the ammeter is placed in the circuit.

Readings should be taken during the starting period, but if the mo-

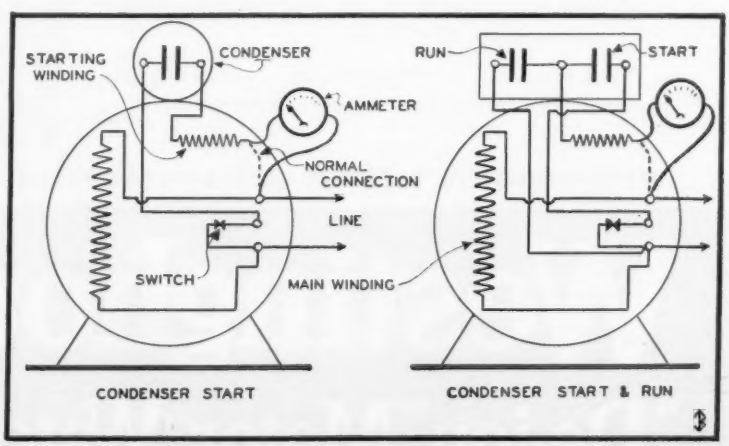

Fig. 3. This method of testing condensers requires opening of the motor to get at starting winding terminals.

tor will not start, quick readings can be taken by plugging the motor to the line for a moment or two. To decide whether the capacitor measures up to requirements calls for a little figuring. After the ammeter reading has been obtained (at the instant of starting), and the line voltage is definitely known, proceed as follows:

C = (I × K)/E where
C = capacity in microfarads
I = current input in amperes
E = voltage across capacitor
K = constant to correct for circuits of different frequency. For 60 cycles, K = 2650; 50 cycles, K = 3185; and 25 cycles, K = 6370.

Here is an actual example: At the instant of starting with the ammeter connected as shown in Figure 3, a reading of 3.3 amperes is obtained. Since this is 60 cycle current, we multiply it by the figure 2650 (as shown above). This gives us 87450, which is then divided by the voltage (110). We arrive at the number 79.5, which is the actual capacity of the condenser in microfarads. Now since the condenser has "115 mfd" stamped on the case we can immediately see that the condenser is much too low in capacity for efficient operation and that it should be replaced.

Here are a few final hints on servicing condensers:

Condensers of the electrolytic type are affected by extreme temperatures. 20° F. or lower may cause condenser to lose capacity to the point where motor will not start. If of the automatic start and stop type, the motor may stand still and burn out before the heat from the motor has time to warm up the condenser. Temperatures in excess of 165° F. are likewise liable to cause condenser failure.

The frequency of operation of electrolytic condensers should not exceed two starts per minute, and each starting period should be held down to approximately 3 seconds duration. For safety and best results the total time the starting condenser is actually in use should not exceed one or two minutes in any one hour.

There is no trick to servicing capacitor motors once the functions of the condensers and the various tests are known. Since capacitor motors are becoming one of the leading types among the fractional horsepower sizes, the motor repairman will profit by becoming familiar with their tests and characteristics.

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Connecting Diagrams for Lap Wound Motors

Part I

By A. C. Roe

Railway Motor Engineer
Westinghouse Electric & Mfg. Co.

THIS article is the first in a series that will present 45 modern connecting diagrams for two and three phase lap wound induction motors, for use on four, six and eight pole windings.

In this series, all of the series connections have been arranged so that they can be used as single or a dual voltage connecting diagram; that is, for either series or two parallel, by bringing out eight leads on two phase windings, and nine leads on the three phase motors. In this manner, a motor can be arranged for 110 and 220, or 220 and 440 volts, by changing external leads.

Dual voltage diagrams are provided for the four pole, two and four parallel connections; six pole, three and six parallel connection; eight pole, two and four parallel, and also four and eight parallel connections.

The four and three lead diagrams for the two, three and four parallel connections are arranged for best magnetic balance and so that additional equalizer connections can be applied to reduce noise, etc.

All of these diagrams are of the one-line type, that is, a short line represents a complete pole phase group of coils, and each of these groups are numbered in clockwise rotation. The number of groups in any diagram is equal to the number of poles times the number of phases. Thus in Fig. 1, a four pole, two phase diagram, there are eight pole phase groups.

Table No. 1 lists all of the 45 diagrams and the figure number indicates the sequence of publication. The table is arranged into three vertical sections to separate the two phase, three phase star, and three phase delta connections. The three horizontal sections di-

TABLE Nº 1

Connecting Diagrams for Lap Wound 2 and 3 Phase
Induction Motors
Single and Dual Voltage Connections

No. Poles	2-PHASE			3-PHASE STAR			3-PHASE DELTA		
	Connection	No. Leads	Fig. No.	Connection	No. Leads	Fig. No.	Connection	No. Leads	Fig. No.
4	Series or Parallel	4 or 8	1	Series or Parallel	3 or 9	2	Series or Parallel	3 or 9	3
	* Parallel	4	4	* Parallel	3	5	* Parallel	3	6
	2 or 4 Parallel	8	7	2 or 4 Parallel	9	8	2 or 4 Parallel	9	9
	4 Parallel	4	10	4 Parallel	3	11	4 Parallel	3	12
6	Series & Parallel	4 or 8	13	Series & Parallel	3 or 9	14	Series & Parallel	3 or 9	15
	* Parallel	4	16	* Parallel	3	17	* Parallel	3	18
	3 & 6 Parallel	8	19	3 & 6 Parallel	9	20	3 & 6 Parallel	9	21
	* 3 Parallel	4	22	* 3 Parallel	3	23	* 3 Parallel	3	24
	6 Parallel	4	25	6 Parallel	3	26	6 Parallel	3	27
8	Series & Parallel	4 or 8	28	Series & Parallel	3 or 9	29	Series & Parallel	3 or 9	30
	* Parallel	4	31	* Parallel	3	32	* Parallel	3	33
	2 & 4 Parallel	8	34	2 & 4 Parallel	9	35	2 & 4 Parallel	9	36
	* 4 Parallel	4	37	* 4 Parallel	3	38	* 4 Parallel	3	39
	4 & 8 Parallel	8	40	4 & 8 Parallel	9	41	4 & 8 Parallel	9	42
	8 Parallel	4	43	8 Parallel	3	44	8 Parallel	3	45

* These diagrams are arranged for magnetic balance and equalizer connections.

This tabulation shows the entire range of motors that will be covered in this series of article. In all 45 connection diagrams will be published as indicated by the figure numbers.

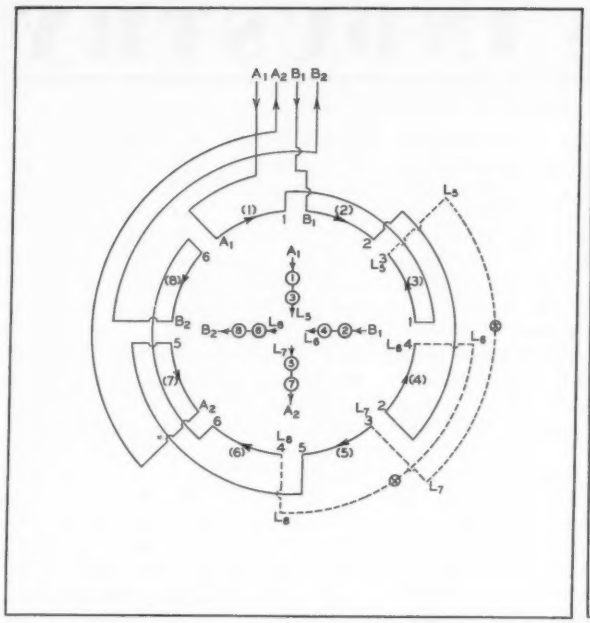


Fig. 1. Diagram for 4-pole, 2-phase with 4 or 8 leads for series or parallel connection. For 8 leads bring out: A_1, A_2, L_5, L_7 for A-phase; and B_1, B_2, L_6 L_8 for B-phase. For series connection connect A_1 and A_2 to A-phase lines; B_1 and B_2 to B-phase lines; connect L_5 and L_7 together; and connect L_6 and L_8 together. For parallel connection connect A_1 and L_7 to A_1 line; connect A_2 and L_5 to A_2 line; connect B_1 and L_8 to B_1 line; and connect B_2 and L_6 to B_2 line.

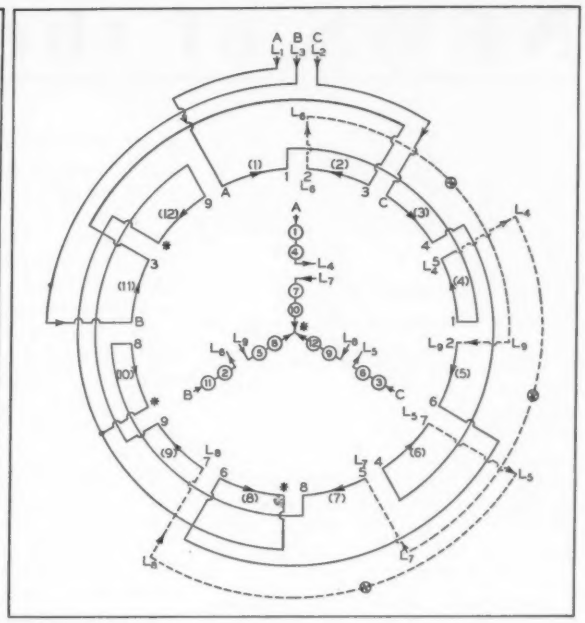


Fig. 2. Diagram for 4-pole, 3-phase, with 3 or 9 leads for series or parallel star connection. For 9 leads bring out: A, L_4, and L_7 for A-phase; B, L_8 and L_9 for B-phase; and C, L_5, and L_8 for C-phase. For series star connection connect A, B, and C to lines; connect L_4 and L_7 together; connect L_5 ad L_8 together; and connect L_6 and L_9 together. For two parallel star connect A and L_7 to Line A; connect B and L_9 to line B; connect C and L_8 to line C; and connect L_4, L_5 and L_6 together.

vide the table into 4, 6 and 8 pole groupings. Under the caption "Connection" is listed the type of diagram, and under "Number of Leads" is listed the number of leads required for any one diagram.

With this article are presented three diagrams Figs. 1, 2 and 3, for use with four pole motors and, as shown in Table No. 1 any one of these diagrams may be used as either a single voltage (series) connection or for dual voltage.

This dual voltage feature can be used to advantage for motors that are often required to operate on two different line voltages. By selecting a suitable dual voltage connection, it is possible to adapt the motor for use on 110 and 220 volt, or 220 and 440 volt combination. For example, assume that a 220 volt, two phase, four pole motor is received with a two parallel connection. Then when rewound as shown in Fig. 1 with eight leads brought out, the winding will be suitable for 220 or 440 volt operation, by arranging the leads outside the motor for a two parallel connection for 220 volts or for a series connection for 440 volts.

If a 110 and 220 volt dual voltage combination was required, then Fig. 7, Table No. 1, could be used, as the two parallel connections would provide 220 volts and the four parallel connections would permit operations on 110 volts. Thus Table No. 1 can be used to select various combinations of diagrams.

In Figures 1, 2 and 3 some connections or jumpers between pole (*Continued on page* 46)

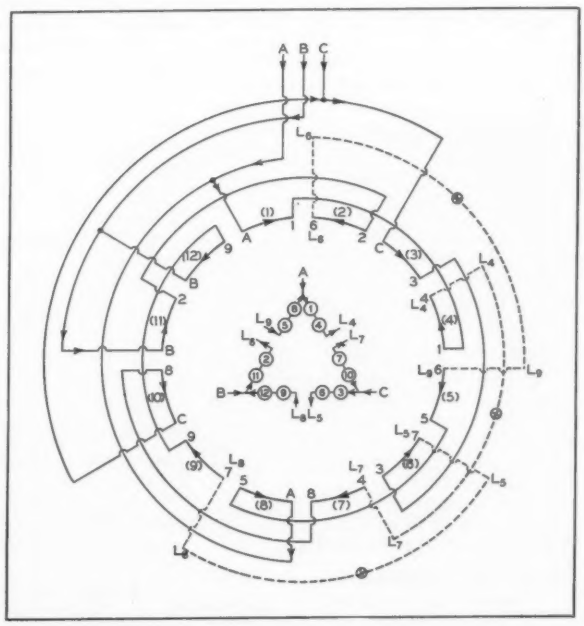


Fig. 3. Diagram for 4-pole, 3-phase, with 3 or 9 leads for series or parallel delta connection. For 9 leads bring out A, L_4, and L_7 for A-phase; C, L_5 and L_8 for C-phase; and B, L_6 and L_9 for B-phase. For series delta connection connect A, B, and C to lines; connect L_4 and L_7 together; connect L_5 and L_8 together; and connect L_6 and L_9 together. For parallel delta connect A, L_7 and L_6 to A-phase; connect C, L_8 and L_4 to C-phase; and connect B, L_9 and L_5 to B-phase.

NEWS of the INDUSTRY

Utilities

TVA Purchase of Utility Delayed

Consummation of the sale of the Tennessee Electric Power Company properties by the Commonwealth & Southern Corporation to the Tennessee Valley Authority and associated municipalities, was delayed when the House rejected Senator George W. Norris' bill granting the TVA authority to issue $100,000,000 in bonds.

The House adopted the Military Affairs Committee bill, which limited the bond issuing authority to $61,500,000, and which included drastic restrictions that would confine future activities of TVA to sixteen Alabama counties, northern Mississippi and the area in which it now operates. In addition, the House bill would require that the accounts and disbursements of the Authority be subject to the same procedure in relation to the General Accounting Office as other governmental agencies.

Up to June 30 no compromise provisions had been agreed upon by a conference committee representing the House and Senate.

Discussing the House bill, Representative Andrew J. May, of Kentucky, said "The adoption of this bill will go a long way in restoring public confidence in the future of the electric utility industry, and at the same time will permit the TVA to continue to engage in the activities that it is now carrying out and, in addition, to undertake such new activities as are at persent contemplated."

Service Supervisors Meet in Atlanta

Unusual interest was exhibited in a meeting for service supervisors sponsored by the Engineering and Operation Section of the Southeastern Electric Exchange, June 16th and 17th, in Atlanta.

R. I. Butterworth, general superintendent, East Tennessee Light & Power Company, and chairman of the Engineering and Operation Section, presided over the meeting.

Among those who addressed the meeting were Chas. T. Brasfield, Jr., service supervisor, Alabama Power Company, who discussed the selection and training of service department personnel.

"Methods of Controlling Repair Parts Stock," was the subject of a talk by J. O. Kimrey, superintendent of service and meter department, Durham Public Service Company.

The subject of appliance servicing was discussed by R. B. Schroeder, service supervisor, Florida Power Corporation, and W. D. O'Brien, general appliance department superintendent, Georgia Power Company. Mr. Schroeder's subject was "Reconditioning of Major Appliances." "Cost of Appliance Servicing" was discussed by Mr. O'Brien.

Service and installation practices were discussed by W. F. Ogden, commercial engineer, Edison General Electric Appliance Company. Also on the program was L. K. Baxter, merchandise service manager, Westinghouse Electric and Manufacturing Company, who discussed servicing and its relation to the utilities from the manfacturers' viewpoint.

One of the features of the meeting was an informal round table discussion at which such topics as the following were discussed: Trouble dispatching and recording, theft of current, general service department organization and methods, complaint records and digest of complaints, and charges for customer service calls.

Rate Reductions for Domestic Customers

A reduction of approximately $265,000 annually in residential electric rates by the Mississippi Power and Light Company effective June 26 was announced recently by President Rex I. Brown. More than 300 communities served by the company will participate in the rate reduction.

The reduction will make available 3¾, 3, 2, and 1½ cent-steps to residential customers with a special 1-cent rate for electric water heating. Customers will also receive 50 per cent more kilowatt hours for their monthly minimum, the new rate including 15 kilowatt hours instead of 10 kilowatt hours in the minimum charge.

This is the second rate reduction made by the Mississippi Power and Light Company in less than a year. It followed a recent contract signed between the city of Memphis and the Tennessee Valley Authority, wherein the Mississippi Power and Light Company is to purchase some available power from the TVA.

* * *

The second reduction in electric rates in New Orleans within a year was announced June 8 by New Orleans Public Service, Inc., and will become effective July 1.

The reduction affects the second step only of the residential rate. This step, which follows an initial block of 10 kilowatt hours charged for at a flat rate of 90 cents, will be reduced from 4½ cents to 4 cents per kilowatt hour. The block affected by this reduction includes 80 kilowatt hours.

The saving to domestic customers resulting from this reduction is estimated at $225,000 annually. The savings resulting from the rate reduction made less than a year ago were estimated at $500,000 annually, making a total of more than $725,000 a year in savings for the two reductions.

Knoxville Rehabilitating Electrical System

Contracts for underground extensions, switch houses, oil circuit breakers and regulator stations, in the general rehabilitation of the Knoxville electric system, were to be let early in June by the Power Board of Knoxville, Tenn.

The contracts will involve an outlay of approximately $130,000 and form part of the $650,000 extension program authorized by the board shortly after it was inducted into office.

Texas Towns Vote Down Municipal Plant Bonds

In a warmly contested election, citizens of Kenedy, Texas turned down May 20 by a vote of 225 to 217 a proposal to float $100,000

in revenue bonds to build a municipal electric system to distribute Lower Colorado River Authority power. Voters of LaGrange and Eagle Lake also recently rejected similar proposals, preferring to rely on the facilities of privately-owned systems.

Kenedy and surrounding towns are now served by the Central Power and Light Company.

Bessemer Officials Consider Power Purchase from Utility

A proposal for purchase of power at wholesale rates from the Birmingham Electric Company, instead of from the Tennessee Valley Authority, was discussed in a letter to council members from Martin J. Lide, consulting engineer for the Bessemer electric distribution system now under construction in Bessemer, Ala.

The proposal will provide a 30-year contract between the City of Bessemer and the Birmingham Electric Company and would result in abandonment of current construction work on a transmission line from Bessemer to Guntersville, Ala., where the TVA has a large dam. The proposal would also provide for the elimination of competition between the Birmingham Electric Company and the City of Bessemer in a three-mile zone outside the city limits.

Carolina Lighting Engineer Wins National Award

S. H. Johnson, illuminating engineer for the Carolina Power & Light Company, Raleigh, N. C., was awarded the third prize of the national Augustus D. Curtis award for outstanding contributions to commercial lighting during the past year. The awards were made at the annual convention of the Edison Electric Institute in New York early in June.

Utility Veteran Honored In Wheeling, West Va.

C. Hal Brues, assistant general manager of Wheeling (W. Va.) Electric Company, completed 50 years of service with the company last month. At a dinner in his honor, attended by more than 500 company employees and by nationally-known utility executives from other companies, Mr. Brues received a gold watch and scroll from his fellow employees as a token of their esteem.

Among other gifts, Mr. Brues received orders for 104 electric ranges and water heaters, the result of a single month's effort on the part of the company sales employees and the biggest one-month sales record on ranges and water heaters in the company's history.

The sales program which resulted in these orders emphasized the Modern Kitchen Bureau's "Guess Again" campaign directing attention to the low cost of electrical cooking. A feature of the campaign was the use of check meters installed on electric ranges in the homes of fifty customers, willing to cooperate, which measured the actual cooking operations during the month. The actual cost data obtained in this way was featured in newspaper advertisements and direct mail folders.

Dealers

Knoxville Celebrates Appliance Week

ELECTRICAL Appliance Week, promoted in Knoxville, Tenn., by the Major Appliance Bureau, was so successful that George Mankle, who originated the idea, believes it will spread into national observance.

All electrical appliance dealers cooperated in putting on special displays, first laying down a barrage of advertising, including a 14-page section in the Knoxville *News-Sentinel*. They had previously laid groundwork for getting the people appliance-minded by sponsoring the Tennessee Valley Electrical Exposition.

People for miles around came to Knoxville to buy electrical appliances during Electrical Appliance Week. Electric ranges especially sold good. A 50 per cent increase in the sale of electrical appliances during 1939 over last year is forecast by C. O. Carpenter, Jr., city electrical department sales manager. His figures on sales indicate that the total this year will reach two and a half million dollars.

Officials of Knoxville's Major Appliance Bureau as they mapped plans for their successful Electrical Appliance Week. They are T. W. Justice, chairman, and D. F. Baker and R. A. Jarnagin, vice chairmen. At left is one of the dealer displays tying in with the week's promotion; dealers reported substantial increases in sales.

Electric range sales for six months increased 94 per cent over the same period of the previous year. Water heater sales were up 150 per cent over 1937 and 264 per cent over the 1936 period. Washing machines were up 21 per cent and small appliance sales up 60 per cent.

Mayor W. W. Mynatt issued a proclamation for Electrical Appliance Week, urging "all those interested in purchasing any type of appliance to visit the dealers handling these appliances to determine the best models for their particular use."

Florida Campaign Efforts Successful

Final results of the "Battle Cry of Freedom" campaign sponsored by Florida Power & Light Company for electrical dealers in southeastern Florida were announced recently with Sears-Roebuck & Company leader in the campaign, followed by General Home Appliance Company and Domestic Refrigeration Company, for second and third place, respectively. Appliance sales during the campaign period, which extended from March 29 through May 28, for the southern division were as follows:

Appliance	Sales
Fans	998
Washing Machines	387
Vacuum Cleaners	540
Water Heaters	139
Ranges	590
Refrigerators	1516
Ironers	54
Roasters	270

Virginia Dealers Revive League

Representatives of a number of retail electrical refrigeration dealers doing business in the Norfolk and Portsmouth, Va., area, met recently to form an organization having as an objective the elimination of bad business practices now prevalent in the refrigeration industry.

Those assembled agreed to form an association of appliance dealers for the purpose of promoting more profitable business. By-laws and other features of an inactive Tidewater Electric League were revived.

The officers elected included Chas. Grant, president; L. E. Parker, first vice president; Jack Davis, second vice president; M. L. Crockin, third vice president; H. B. Price, Jr., secretary; and M. Deering, treasurer.

The association will meet with distributors operating in this territory in an effort to solicit their cooperation and encouragement for better business practices within the refrigerator industry.

Among the companies represented at the meeting were Colonial Sales Co., Hoffer Bros., J. W. Legum, Boyce and Kirchmier, A. J. Legum, Crockin-Levy, Ames and Brownley, Morris Music Shop, B. G. Appleby, Eugene Sargeant and Co., Tyree Williams, M. C. Crockin, Sears-Roebuck, Eastern Electric Corp., Reynolds Hardware, Drummond Hix and Winston, Norfolk Appliance Corp., Grant Electric Co., and Price's, Inc.

Successful Publicity Staged By North Alabama Dealers

Electrical dealers and repair companies in Tennessee Valley towns are conducting a unique experiment to impress on local merchants in Athens, Huntsville, Florence, and Sheffield how important are their weekly payrolls on community trade and welfare.

In order to make their point the various firms, 8 in Athens, 8 in Huntsville, 6 in Florence and 2 in Sheffield, are paying their aides in silver dollars. In this way the merchants will be able to see clearly in their tills and cash drawers how much these firms mean to the civic welfare and commerce of the towns involved.

Around $4,000 weekly is involved in this disbursement. Local banks cooperated in rounding up this quantity of the old "wagon wheels" now little seen in active use.

Cooling and Ventilating Drive Opens Over Radio

An intensive campaign for better business in Birmingham, Ala., is being sponsored by the Electrical Association of Birmingham which is organizing its forces for a special drive during the summer.

Air conditioning for Birmingham homes, offices and stores is one of the objectives of the association. The campaign will be launched with a series of radio talks discussing modern cooling and ventilating systems.

Recently elected officers of the association, which is composed of dealers, distributors, electrical contractors, and utility representatives, include D. B. Clayton, Knight Electric Company, chairman; and D. S. Richard, Birmingham Electric Company, secretary-treasurer. The executive committee is composed of Walter Ballew, R. T. Brooke, C. R. Matthews, Ed Henley, Johnny Simmons, D. B. Clayton, Jack Evans, W. L. McAllister, Barney DeRamus and Mr. Richard.

Chairmen of the other committees are as follows: Mr. DeRamus, industry organization and better sight committee; John Shaw, planning committee; J. B. Roberts, publicity committee; M. B. Hinman, adequate wiring committee; Gordon Smith, kitchen modernization committee; Roy Knox, electric show committee; and R. P. McDavid, attic ventilation committee.

New Firms, New Stores, And New Lines —

The Newberry Electric and Equipment Company, authorized dealers for the complete line of Frigidaire equipment both household and commercial, as well as Delco stokers, and Maytag washers and ironers, opened in Cleveland, Tenn., recently under the management of Tom Newberry, a former employee of the Tennessee Power Company.

Mr. Newberry was associated with the power company for more than six years, serving in the capacity of refrigeration and heating engineer, and has also had considerable experience in the commercial cooking field.

* * *

The Electric Appliance Company opened for business recently in Fayetteville, Ga., under the management of Howard Burch. This new dealership will carry a complete line of Kelvinator refrigerators, ranges, water heaters, and washing machines, and Philco and Zenith radios. A large line of other appliances will be stocked and water systems for every type of well will be sold.

* * *

T. G. Brown recently opened the Brown Home Appliance Store in Opelousas, La. This new firm will specialize in Norge refrigerators, R. C. A. radios and a complete line of home appliances. R. P. Walker is sales manager of the company.

A new refrigeration service shop, to operate in conjunction with the Barber Electric Company, was opened recently in Greenville, N. C., by Elmo Joyner. Mr. Joyner has had a wide experience in refrigeration service work.

* * *

M. and W. Electric, Inc., of Enfield, N. C., was organized recently to operate an electrical equipment business. J. C. Whitaker, H. M. Whitaker, and C. M. Miller, all of Enfield, are stockholders in the new enterprise.

* * *

M. S. Chase, Jr., recently opened a new electrical appliance store in Florence, S. C., under the name Chase Fuel & Appliance Company. Among the appliances which will be handled by the new firm are those manufactured by Kelvinator, the Universal line, and Zenith radios.

* * *

Bryant Electric Company of St. George, S. C., recently moved from the Dukes Building to the Rickenbacker Building, which has been completely remodeled.

* * *

John F. Ramsey, local General Electric appliance dealer in Farmerville, La., recently moved his business into a new brick building on Main Street. Mr. Ramsey handles a complete line of electrical appliances and also operates an electrical wiring and repair business.

Inspectors

Kentucky Inspectors Meet in Cincinnati

The Kentucky Chapter, International Association of Electrical Inspectors, and affiliated electrical contractors, concluded its semi-annual meeting at the Hotel Gibson, Cincinnati, Ohio, on June 10.

Recognized for their well balanced and interesting programs, the Kentucky Chapter's current meeting proved to be one of its best.

The first session was called to order by Chairman R. E. Barry, Thursday morning, June 15. Following a report of the secretary-treasurer, Victor Knadler, the group heard Sheldon B. Storer, of Trumbull Electric Manufacturing Co., discuss "Bus Bar Distribution Systems." V. H. Tousley, electrical field engineer, N.F.P.A., followed Mr. Storer on the program, discussing "Inspector's Problems."

Motor circuit control was the topic of a talk by R. A. Rearden, of Bussman Mfg. Co., which was followed by a committee report on Article 300, and the Edison Electric Institute proposals for code changes.

Subjects discussed at the afternoon meeting included fluorescent lighting by Al. Paulus and Thomas Armstrong, both of the Westinghouse Company, and service equipment and enclosed switches by J. A. Trovillo, assistant electrical engineer of Underwriters' Laboratory, Inc.

R. E. Barry, chairman of the Kentucky Chapter, International Association of Electrical Inspectors.

The Thursday afternoon session included a committee report on new materials, wiring methods and devices presented by W. D. Roach, chairman. A discussion of unusual wiring problems, led by R. J. Heffernan, concluded the session.

Of particular interest to the group was the talk by P. M. Geary which opened the Friday morning session on "The Labor Relations Committee of the National Electrical Contractors Association." Mr. Geary is field representative of the labor relations committee, N.E.C.A.

"Activities of the R.E.A., Present and Proposed," was the subject of a talk by J. Warner Pyles, of the utilization division of R.E.A.

Dinner-dances at the Highland Country Club, luncheon at the Little Brown Jug Club, and a boat ride to the Yacht Club were some of the features of the entertainment program. The program also included special periods for the inspection of equipment on display by the various manufacturers and arrangements were made for an inspection tour through the Wadsworth Electric Manufacturing Company plant in Covington on Friday afternoon.

V. F. Knadler, Secretary-treasurer of the Kentucky Chapter, I.A.E.I.

Non-Tamperable Fuse Mandatory in Shreveport

The city of Shreveport, La., recently adopted an ordinance making mandatory the use of non-tamperable plug fuses and fuse holders, according to Frank G. Camus, city electrician, of Shreveport.

The new ordinance requires that plug fuses and fuse holders for same shall not be of Edison base type and shall be of such a type and so designed as to be subject to tampering or bridging only with difficulty. If an adapter is used as the fuse holder, the ordinance reads, it shall be so designed that once inserted into its receptacle, it cannot be removed without destruction.

The ordinance further reads that it shall be unlawful for any person to change the carrying capacity of any fuse beyond its code rating, and the presence of any such changed fuse in any fuse box, panel or load center shall be prima facie evidence of the violation of this ordinance by the occupant of the premises where such changed fuse or fuses are found.

The new requirement is effective in all new construction, in all remodeling and alteration of electric wiring, and in all cases where the carrying capacity of the fuses has been changed beyond its code rating.

Wholesalers

New Service Offered by Richmond Branch of GESCO

William E. Henry, Jr., has been added to the staff of the General Electric Supply Corporation, of Richmond, Va., and will serve as sales engineer, according to announcement by Boyd A. Propert,

district manager. Mr. Henry will provide lighting and power apparatus engineering service for electric contractor, commercial and industrial customers of the supply company. Mr. Henry was formerly associated with the Florida Public Service Company, later establishing his own engineering firm in Raleigh, N. C. For a time, he served the North Carolina State Highway Commission as staff engineer.

Columbia, S. C., Distributor Extends Appliance Line

The Furman Distributing Co., of Columbia, S. C., will distribute the Norge line of home appliances and Delco radios in this territory. C. M. Furman, Jr., vice president and sales manager, reports that business in this territory has been unusually good.

New Building Occupied by Tampa Distributor

The Electric Supply Company, Inc., Tampa, Fla., has recently moved into a new building at 106 South Franklin Street. The new building offers greatly improved facilities such as well placed stock bins, conduit racks, wire racks, loading platform, and chute from second floor to first floor shipping department. The attractive new fixture and radio showroom is another feature of the new building.

W. J. Pinkston is manager of the Electric Supply Company, Inc., and has seen this organization grow from a small company employing only four people to the present organization with fourteen employees. B. L. McGowan and Fred S. Bergh are in charge of the service department.

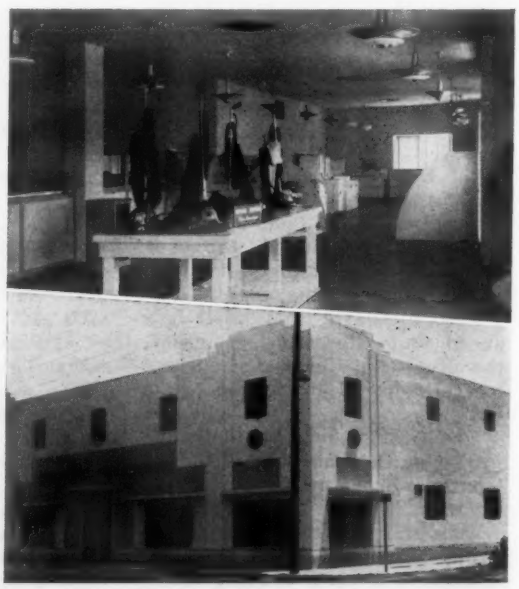
Miami G-E Supply Co. Occupies New Quarters

The Miami branch of the General Electric Supply Corporation has recently moved into its new quarters in the downtown section of Miami. The branch is a wholesale operation, distributing electrical equipment and household appliances. The official opening and "open house" celebration will be held soon but the building has been occupied since May 9th. Fred C. Elwes is manager of the branch, and H. M. Powers is service manager.

The building has two stories, the lower floor being given over to offices, display space, and a retail supply department. The front entrance opens onto a display room running the entire breadth of the building. Facing the door is a retail supply counter, backed up by large shelves, and flanked on one side by Mr. Elwes' office, and on the other by the business office.

The loading entrance and shipping department is at the side rear of the building, with entrance to a stock room occupying the rear half of the ground floor. The second floor is an undivided warehouse space. The branch carries a heavy stock of every General Electric product except radios, including major electrical appliances and electrical supplies, to supply all G.E. retailers in the miami area.

The ground floor display room and offices are finished in cream with linoleum covered floor, and are entirely air-conditioned, with indirect lighting fixtures throughout. The floor space of the building occupies about one-half a city block. The location is conveniently near the terminal of the Florida East Coast Railroad. Exterior of the warehouse is attractively stream-lined, bearing the G.E. monogram at each corner.



Views of the new home of General Electric Supply Co. of Miami.

Southern Wholesale Men Place in National Contest

William Tyner of the Richards & Conover Hardware Company of Oklahoma was the winner of the grand award in Kelvinator's "Silver Jubilee Dealer-Getting Contest," which was started in February and concluded recently, it was announced by Henry W. Burritt, vice president in charge of sales. In all, 148 cash prizes are going to wholesale men in all parts of the country who qualified in the contest.

Winners of the second and third national prizes were respectively Wilbur Hawkins of the Eastern Company, Cambridge, Mass., who gave top-man Tyner tough competition all the way, and Joe Pleasants of the Carolina Sales Company, Greenville, N. C., who played the role of dark horse early in the big contest, but who passed a number of early-season favorites to take one of the major awards.

Cooperatives

REA to Demonstrate Farm Equipment

At least four southern states will be included in the itinerary of the National Farm Equipment Tour which will get under way July 1, it is announced by Washington headquarters of the Rural Electrification Administration which is sponsoring the tour.

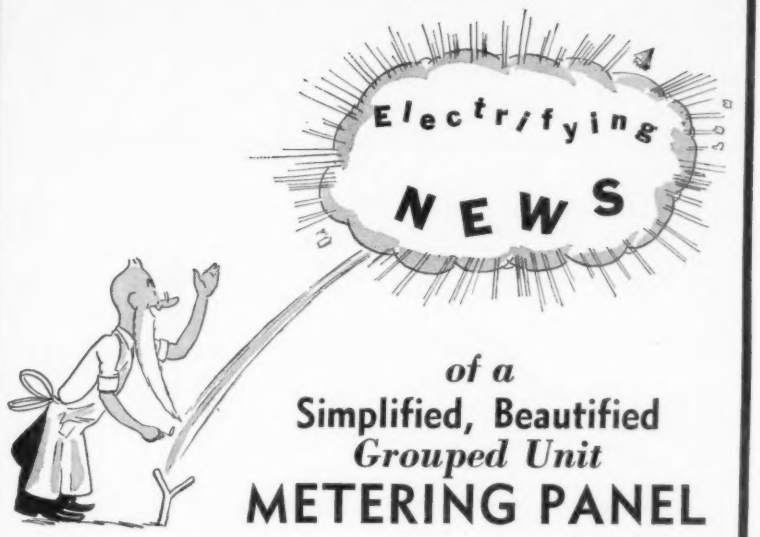
Missouri, Oklahoma, Arkansas, and Texas will be visited during the tour, according to present plans. The series of farm and home demonstrations is scheduled to close in Texas Dec. 22.

Following the plan used in an experimental tour in Iowa and Nebraska last fall, the caravan will set up a main tent and midway on farms centrally located on REA projects and put on demonstrations of farm and home appliances during the daytime and evening. Feed grinders, brooders, pumps, and other farm appliances are plugged in along a power cable strung out on the midway. Demonstrations of these appliances are held throughout the day. Changes in location are made twice a week.

REA has ordered a tent covering more than 7000 square feet for the national tour under which manufactureres will exhibit home and farm appliances. Evening demonstration and cooking classes will be conducted by home economists traveling with the tour.

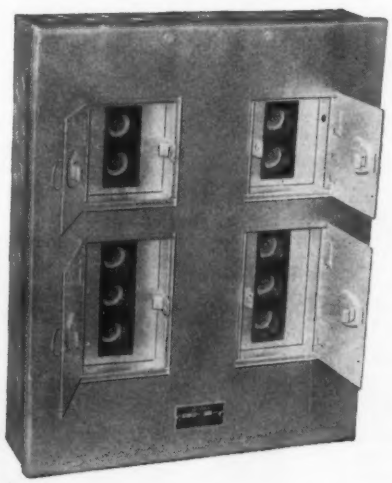
The size of the cavaran has not as yet been determined but REA expects all leading manufacturers of both farm and electrical equipment to be represented. Several trailers accompanied the tour in the middle west last fall. Commitments have been made by leading manufacturers to send exhibits along, according to REA officials in Washington.

The purpose of the tour is more than educational. REA hopes to increase the number of appliance dealers all along the route which tentatively will start in Ohio or Illinois before entering the South. The opportunity created by the tour to produce dealers along the route is illustrated in the case of one pump manufacturer last fall who secured a dealer at every stop through Nebraska and Iowa.



of a
Simplified, Beautified
Grouped Unit
METERING PANEL

WECO ATLANTA



Compact and convenient, Walker's newly improved Unit Type Panel enables metering any number of individual apartments from a central location.

Panels are of either single door or individual door construction. All units are bussed together with a disconnecting means for use when meters are required.

Combinations of two and three circuits (as illustrated) can be furnished.

Inquire at your nearest Walker jobber — or send for Catalog No. 16

WALKER
ELECTRICAL COMPANY
ATLANTA, GEORGIA

MANUFACTURERS' News

Fall Programs Announced By Modern Kitchen Bureau

Capitalizing on the universal interest in the New York World's Fair and the San Francisco Fair, the Modern Kitchen Bureau will promote the two months September and October as a "National Electric Range Exposition." Promotional material is being developed by the Bureau to enable the utility and dealer to conduct his own electric range exposition right in his own store.

A complete plan book, giving details on this campaign and containing full information on the use of the tie-in material will be available in July. Tie-in material will consist of window banners, a series of store arrows which can be run from the store entrance or from a traffic counter over to the range display, a series of two direct mail folders, a special series of four newspaper advertisements, radio spot announcements, and a sales training booklet for retail salesmen.

The Bureau also plans a fall electric water heater campaign to be conducted during the months of September and October, the campaign being known as the "Time to Change" campaign. Special material to enable each utility and dealer to conduct its own individual sales campaign will be available.

The Bureau reports that 108 utilities used its material in conjunction with spring water heater campaigns this year as compared to only 28 a year ago.

Other fall campaigns in preparation by the Bureau are an electric roaster campaign which will be promoted by special advertising during October, November and December, and an over-all kitchen campaign for the utility or dealer actively engaged in selling the all-electric kitchen on the step-by-step plan or as an ensemble. For the latter campaign, there is available kitchen planning kits, booklets on the modern all-electric kitchen, counter cards, newspaper advertisements, an animated window display sign, and a sound slide film which tells in words and pictures of how one family became convinced it should have a modern kitchen.

Philco Executives Attend Distributor Meetings

Immediately following the annual convention which was held at French Lick, Ind., from June 5 to 8, Philco executives from Philadelphia headquarters began a swing around the entire country which will take them to 52 cities to attend Philco dealer and distributor meetings.

Thousands of dealers in the various territories, meeting with their distributors, will see the new 1940 Philco radio line and will hear Philco executives explain in detail merchandising and advertising plans for the coming year. They will hear Philco's policy on television in conjunction with the announcement of a limited number of television receivers at the convention.

Electric Ironer Sales Closing Tool

A powerful sales closing tool for use by electric ironer salesmen has been developed by R. W. Poirson, in charge of Kelvinator's laundry equipment sales. This device, a marked, model shirt indicates clearly the various operations necessary for easy ironing of a shirt.

Arrows stitched into the shirt show the operator the direction in which to iron and the various operations are designated in the proper order by numerals stitched in beside the arrows.

"We're gratified that the marked shirt is proving a powerful selling tool," declares Mr. Poirson. "Reports from the field tell us that it's closing many sales, because a Kelvinator selling man, intent upon closing an ironer deal, can actually show the housewife how easy the operation is if the proper ironing formula is followed."

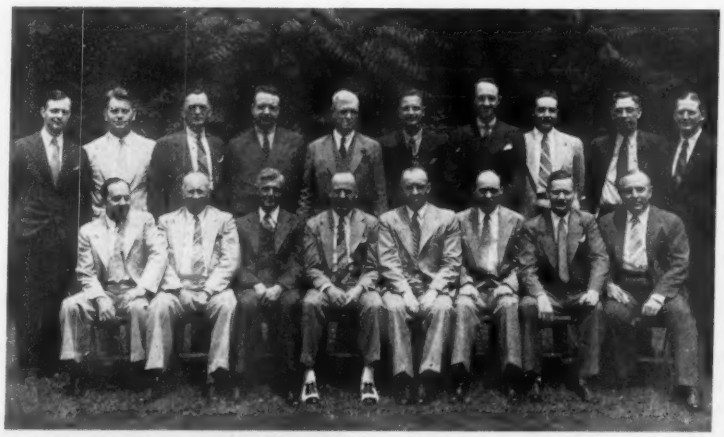
Officers Named for Bulldog Company

Bulldog Electric Products Company, Detroit, Mich., recently announced the election of the following officers: Wm. H. Frank, president; M. C. Emery, executive vice president; J. J. Mitchell, vice president in charge of sales; A. J. Lennerts, vice president in charge of manufacturing; Wm. H. Frank, secretary, and M. C. Emery, treasurer.

Death Claims Easy Washing Machine Executive

Morton Gilde, general sales manager of the Easy Washing Machine Corporation, Syracuse, N. Y., died suddenly on June 8 of a coronary thrombosis.

Mr. Gilde had been associated with the Easy Washing Machine Corporation since 1920, serving first as assistant to the general sales manager and later as manager of the New England division. In July of 1937, Mr. Gilde became general sales manager and in that capacity he traveled throughout the United States.



District office engineering representatives convened at the headquarters plant of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., for a week's session of forums and visits to nearby Westinghouse plants. Talks were made by representatives of each of the company's apparatus divisions, regarding new equipment and improvements. Well known to utility engineers of the South are I. T. Monseth, engineering manager, St. Louis office; and H. G. Harvey, engineering manager, Atlanta office, who are seated at extreme right in the front row.

News About People

Lester H. Graves of New York City, vice president of Curtis Lighting, Inc., has been elected to the presidency of the Illuminating Engineering Society, and will take office on October 1, 1939.

Mr. Graves has been associated with Curtis Lighting, Inc., and its predecessor, the National X-Ray Reflector Company, since 1912 when he graduated from the University of Illinois with the degree of B.S. in E.E. In his capacity as vice president of the company, he is in charge of eastern operations.

* * *

P. Y. Danley, Westinghouse Electric and Manufacturing Company, Springfield, Mass., was elected president of the Air Conditioning Manufacturers' Association at the recent annual meeting in Hot Springs, Va.

Mr. Danley is manager of the air conditioning department of the Westinghouse company and has been associated with the company since 1913. He is a graduate of the University of Pittsburgh.

* * *

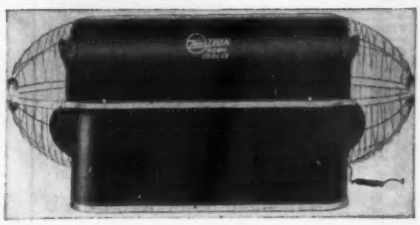
Robert S. Brunhouse has been appointed sales manager of the recently created Stewart - Warner electric range division, according to announcement by F. A. Hiter, vice president and general sales manager for the Stewart-Warner Corporation. Water heater sales will also be directed by Mr. Brunhouse.

* * *

Cutler-Hammer, Inc., Milwaukee, has announced the appointment of **G. S. Crane** as vice president in charge of the sales division, Mr.

Plain Hoss Sense
+ good basic quality
+ up-to-date design
= SUPERIOR
REG. U.S. PAT. OFF.
★ ★ PRODUCTS
THE SUPERIOR SWITCHBOARD & DEVICES CO.
CANTON, OHIO
★ Manufacturing ★
METER & RELAY TEST SWITCHES
METER & TRANSFORMER ENCLOSURES
METER TEST BLOCKS & TABLES

The New
Zephyr TWIN
HOME COOLER



This Quiet, Modern Attic Ventilator is
Your Way to INCREASED PROFITS

FEATURING:

- Twin propellers
- Ease of installation
- Greater air delivery
- Quiet operation
- Modern styling
- Reasonable price
- Compact package unit
- Economical operation
- No special wiring
- Yearly lubrication
- 100% spring-suspended
- Acoustically treated
- Practically vibration-proof
- Self-contained plenum chamber

Examine the features at the left. They will show how Zephyr Twin Home Coolers will open new sales opportunities for you. Zephyr engineers were not restricted by old models when they created the Zephyr Twin. Starting from scratch they created an entirely new and completely modern attic ventilator. Naturally, they capitalized upon the knowledge gained in years of successful building of other Zephyr air circulating equipment. The combination of proved features into a new unit designed to do a specific job better—this is your key to attic ventilator sales.

Write today for complete information about the new Zephyr Twin Home Cooler and other Zephyr products. These include: *Air Circulators* in three price ranges and styles—four mountings—three blade sizes; *Man Coolers* and *Exhaust Fans* for industrial applications.

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7777 W. LAKE ST., RIVER FOREST, ILL.

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TIMESAVERS and PROFIT-MAKERS FOR THE CONTRACTOR

Hydraulic Conduit Benders
Knockout Punches
Knockout Cutters
Cable Puller
Joist Borer
Electricians' Auger Bits
Bit Extensions
Hydraulic Pipe Pusher
Push Drills

Do You Have a Copy of Catalog No. 31E?

Our new Catalog, No. 31E, illustrates and describes all tools listed above, as well as others of interest. If you do not have a copy, send for one now.

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Especially interested in _____

_____

Name _____

Street _____

City and State _____

My Jobber is _____ ES-7-39

Crane now assumes supervision of all of the development work for the company and executive control of the engineering and drafting departments as well as the company's patent department. He has been associated with the Cutler-Hammer Company for 29 years, serving successively in the engineering and sales departments.

* * *

In line with Viking Air Conditioning Corporation's increased advertising and sales promotion activity, Marion I. Levy, president, recently announced the appointment of **A. W. Lehman** as manager of the advertising and sales promotion departments. Mr. Lehman has had wide experience in advertising and sales promotion work with jobbers and dealers in his former connections with Willard Storage Battery Company and Eaton Manufacturing Company.

* * *

Miss Mildred Hickman has been appointed director of the Home Economics Division, Edison General Electric Appliance Co., Inc., according to an announcement by R. W. Turnbull, vice president and general sales manager. She succeeds Mrs. Mary Lowell Schwin who has directed Hotpoint Home Economics activities since 1937. Mrs. Schwin has announced her resignation from the Hotpoint company in order to devote the major portion of her time to her home and family and private research.

* * *

On June 20th, Princeton University awarded an honorary degree of Doctor of Engineering to **Donald M. Simmons**, chief engineer of General Cable Corporation, in recognition of his achievements in the industry. Mr. Simmons graduated from Princeton in 1911 with the degree of A.B. and received his E.E. degree there two years later.

Except for two and one-half years in the army, Mr. Simmons has been in the electric cable field for over 25 years. He is known internationally for his contribution to the field, especially for his development of Type HH cable, the hollow overhead line conductor used in the 287,000 volt lines from Boulder Dam to Los Angeles.

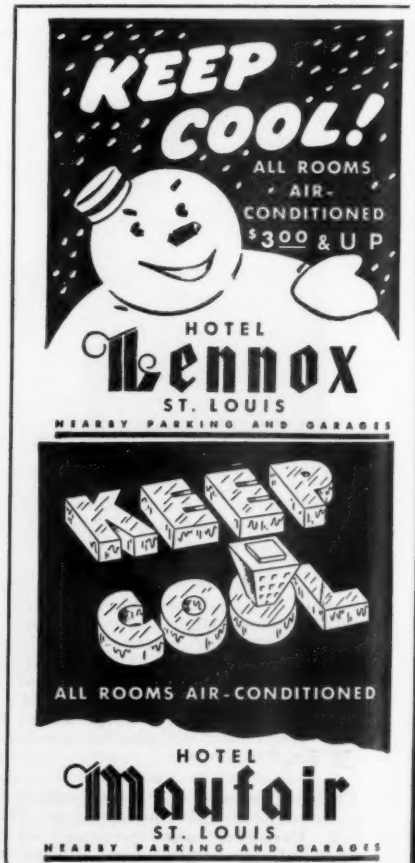
Portable Electric Ironer

Kelvinator has just introduced a new, low-priced, small size electric ironer that will sell at a list price of $29.95. Weighing only 27 pounds, it can easily be carried by the user. It can be conveniently stored in closet or cupboard.

The heavily padded roll, 18 inches long and five inches in diameter, is open at both ends. The shoe of the ironer is of hard metal, chrome-plated. It is equipped with a thermostat which serves a dual purpose, acting as an on and off switch for the heating element and also for control of temperature for best ironing results. The ironer is finished in white baked enamel.

Portable Cooking Unit

The Eureka portable electric range was announced recently by the Eureka Vacuum Company, Detroit, Mich. This new unit, built to sell for $39.95, complete with oven cook-



ing utensils, is portable and can be plugged into any suitable convenience wall outlet. It needs no special wiring installation since the electric input is controlled by patented reciprocating switches which permit the use of both surface burners and oven at the same time. Oven heat is automatically controlled by a thermostat. Surface burners can be folded into the side of the oven when not in use.

"Look-in" Range Door

The new "Look-in" door provided on the Victor model range introduced by the Westinghouse Electric & Manufacturing Company enables the housewife to determine at a glance the progress of her cooking without opening the oven door. Two panes of heavy heat-resisting glass 9-1/2 by 8-1/2 inches comprise the window. The housewife has merely to flip a small switch to turn on a brilliant light in the oven.

The Victor range is the engineer's compromise with the home-maker over the common but exceedingly wasteful habit of opening the oven door while food is baking or roasting. Eliminating the loss of heat that occurs when the oven door is opened, the new model will reduce the current required for baking operations and reduce time required for the actual cooking.

The Victor is a divided top range providing working space in the center with heating units at each side.

At the right is an eight-inch Corox economizer surface heating unit and a standard six-inch Corox unit. At the left is another six-inch unit and an "Economy Cooker," a deep-well aluminum cooker set in the top of the range.

The Victor is a solid steel seamless unit with main body welded into a one piece frame. It is finished in acid-resisting porcelain enamel.

Electric Water Heaters

Two new electric hot water heaters have been added to the Stewart-Warner line extending it to a total of ten models. The new heaters have 15 gallon and 30 gallon capacity. Both units are table top models and are identical except for capacity.

Among the features of this line are Palco Wool insulated and electrically welded tanks; special heat trap; cold water inlet and special curved baffle; automatic thermostats on each heating element; and convenient relief valve opening and drain valve.

Vest Pocket Size Shaver

Remington Rand recently introduced to its trade and to the public a new small electric shaver to be known as the Remington Speedak. This new "vest pocket" size shaver will be packaged as a jewelry item in a black pin seal grain case with

chromium trimming. Designed to retail at $12.50, the Speedax rounds out the line of Remington shavers and is expected to stimulate a new market of men who prefer a smaller, more compact shaver.

PUT US TO WORK!

We can take a big load off your shoulders — when you're after a ventilating job—and when you land it!

We're always ready to pitch in—to help you lay out and figure the installation—even help you sell your prospect.

And, important: you can get quick shipment of Sturtevant Fans—from local stocks.

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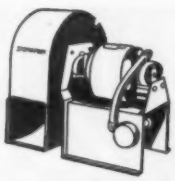
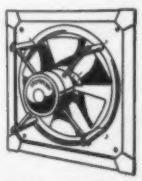
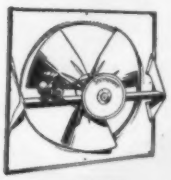
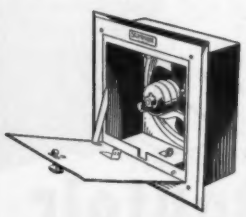
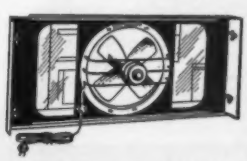

CENTRIFUGAL FANS


PROPELLER FANS


ATTIC FANS


BUILT-IN KITCHEN FANS

Sturtevant
REG. U.S. PAT. OFF.
Ventilating Fans


WINDOW FANS

Molded Bakelite Fan

A new line of fans manufactured by Diehl Manufacturnig Company, New York, featuring a base and body of lustrous molded Bakelite, is now

available in a variety of colors, including black, brown, blue and a brilliant red. Another feature of the new fan is the use of ribbons in place of the usual rigid blades.

Thermador Bilt-In Range

The Thermador Electrical Manufacturing Company recently announced the introduction of a complete line of electric ranges in addition to the water and room heaters manufactured by this company for some time. The Thermador Bilt-In

range, a featured model, presents an entirely new idea in range construction: surface units, baking oven and warming oven are available in separate units to be built into kitchen fixtures.

Another feature of the Thermador line is a two-oven model in a popular price class. With the exception of one model, all Thermador ovens are 18 inches in width. Ranges are complete with five heat switches, and enclosed tube-type surface units.

Apex All White Washer

A new all-white, low-priced washer has been added to the line of Apex washers manufactured by the Apex Rotarex Corporation, Cleveland, Ohio. Specifications include a 16-gal. tub, with washboard sides and quick drain bottom with the improved Apex Double Dasher. The chassis is electrically welded with large 10-inch base. All gears in the mechanism are machine cut, powered with a direct drive ¼ hp heavy duty motor.

Designated as model 330, this machine is equipped with a Lovell wringer of the flume type with self-reversing flume. The wringer has 2-inch rolls, push bar instant pressure release, easy operating end reset, and adjustable pressure for correctly wringing all kinds of fabrics. The wringer is finished in aluminum

The new model is available with or without a self-emptying motor driven pump.

Fluorescent Lighting Equipment

The Pittsburgh Reflector Company now offers a wiring channel and trough type reflector for use with the new flourescent lamps. The new equipment is based on the knockout strip idea.

Principal element is Knockout Strip No. KO-21 which consists of two U-shaped members made of 20-gauge galvanized steel, finished in sprayed and baked aluminum which telescope together. Standard length of section is nine feet, 7½ inches. Each section

contains 20 knockouts spaced 6 inches on centers, ¾ inch ends, and each knockout accommodates two sockets back to tack. Small additional ¼ inch knockouts are spaced alternately two inches and four inches on centers for attaching a reflector. The double knockouts are spaced on 6 inch centers which permits the use of 18, 24, 36 and 48 inch flourescent lamps.

Also available are end caps, supporting U-straps, auxiliary connectors and several types of reflectors for use in building up snug fitting installations.

Service Entrance Cable

New construction for Type SE service entrance cables that provide greater flexibility without sacrificing the quantity or quality of impregnating material used on individual conductors, has been announced by the General Electric appliance and merchandising department, Bridgeport, Conn. Handling is facilitated, and both Style A and Style U can be bent edgewise easily for neat installations.

In this new construction, cellophane is wrapped longitudinally over the black conductors of each cable which permits the conductors to move independently when severe edgewise bends are made. It also prevents impregnating material on the black conductor from bleeding and discoloring the red conductor. In addition, it keeps the concentric uninsulated conductor clean and free of compound.

Projector Spot Lamp

A new highly efficient 150-watt Mazda projector spot lamp has just been announced by the Westinghouse Lamp Division, Westinghouse Electric & Manufacturing Company. Having a bulb made of heat-resistant glass, this lamp somewhat resembles the PAR-38 projector flood lamp but is smaller, lighter and has an inside stippled lens which is not only efficient in light transmission but also produces a minimum widening of the beam.

This new lamp has a high efficiency, producing 10,500 cp in the center of a beam about 20 degrees in width. Its over-all length is 5-5/16 inches and its rated life is 1,000 hours. The medium screw base fits the ordinary light socket.

This lamp produces a beam well suited to show-window spot lighting, supplemental commercial lighting, and local lighting in industrial plants. Because of the hard, heat-resistant, thick glass, the lamp may be used outdoors without danger of damage to the bulb by water.

New Capacitor Motor

Providing single speed operation with the ordinary on and off switch for either 110- or 220-volt circuits, with an inexpensive two-speed switch giving high and low speed operation and with a speed controller giving multi-speed operation with either voltage, a new motor announced by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, for unit heater, fan and blower applications, meets all the requirements it formerly took three to six different motors to meet. This motor comes in 1/20 to ¾-horsepower sizes.

Colt Multi-Breaker

The Electrical Division of Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., has announced the addition of Multi-Breaker Load Centers to their complete line of electrical equipment.

Three types are available, designated as "M", "MB", and "MBM." They provide from one to 16 circuits with breaker ratings of from 15 to 50 amperes. When outdoor installation is necessary, the units are available in raintight boxes. A complete catalog listing is available.

One-Piece Extension Socket

A new one-piece utility extension socket, designated as No. 294, has been announced by the Arrow-Hart & Hegeman Electric Co., Hartford, Conn. This extension socket provides support for the reflector and lamp outlets when existing fixtures are modernized by the application of new reflectors. The porcelain supporting ring is adjustable to permit proper centering of the lamp in the shade or reflector. Extension socket accommodates medium base lamps.

Small Fish Tape Reel

A new handy size fish tape reel and puller designed to fit into any electrician's tool kit is now available from the Ideal Commutator Dresser Company, Sycamore, Ill. Known as the "Junior No. O" size, this new reel combines three tools in one: a fish tape, a reel, and a puller.

It is only 8½ inches in diameter, less than ¾-inch wide, and weighs only 30 ounces including 50 feet of 1/8 inch x .060 inch tape. In spite of the small size, the Junior Model has all the sturdy efficiency of the larger Ideal fish tape reels.

Armature Winding Yoke

Ideal Commutator Dresser Company, Sycamore, Ill., now offers an armature winding yoke suitable for any type of armature with a shaft from 9 inches to 19 inches in length.

CHROMALOX SUPER-SPEED RANGE UNITS

The Unit That Range Buyers Recognize

It's distinctive in appearance—and in performance. It helps you sell ranges. Specify Chromalox on the ranges you handle. Great for replacement, too — they fit all ranges.

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NEW Propeller Fan Bulletin featuring NEW YORK WORLD'S FAIR INSTALLATIONS just out—sent FREE!

Write for your copy today!

AUTOVENT FAN & BLOWER CO. 1825-27 N. Kostner Ave., Chicago, Ill.

Insist on CERTIFIED RATINGS *Install* AUTOVENT *Ventilation*

C. B. ROGERS

ELECTRICAL HEATING ENGINEER
CHROMALOX
ELECTRICAL HEATING UNITS
and
CHROMALOX
EQUIPPED PRODUCTS

1000 PEACHTREE STREET
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INTERVAL TIMERS •

INTERVAL TIMERS, or PROCESS TIMERS, are furnished in two types. One is reset by hand (manually): other resets itself automatically. Both types can be provided for practically any cycle of time, fully adjustable from zero to maximum period. SYNCHRONOUS, SELF-STARTING MOTORS.

SIGNAL TIMERS •

Used extensively for starting and stopping industrial work; school class periods; for municipal time signals, etc. Up to six signal periods, permanently set at factory with Sunday & Holiday Cutout and Manual Control, at a list price of only $35.

TIME SWITCHES •

TRIPLE POLE • DOUBLE POLE • SINGLE POLE
All three types can be furnished with capacities ranging from 20 TO 200 AMPERES PER POLE, listing from $16.50 up. Ten ampere Time Switches from $4.95 up.

Write for Information

AUTOMATIC ELECTRIC MFG. CO.
MANKATO, MINNESOTA

The yoke enables the operator to wind armatures in either a lathe or a coil winding machine.

The yoke consists of two cast iron arms fastened to a round cast iron mounting base designed so that they may be adjusted to increase or decrease the amount of span of the yoke. Machined steel jaws for clamping the armature are mounted on the outmost end of each arm. Only one-half turn of the locking knob clamps or releases the armature.

A third or small auxiliary arm is provided to form the loop after winding each coil by merely twisting the wire around the steel pin before starting the next coil.

The new armature winding yoke is made with a suitable base for mounting on the face plate of any yathe or turning device. Net weight of the unit is 28 pounds.

Copperspun Rotor

Fairbanks, Morse & Co., of Chicago, recently announced a new one-piece centrifugally cast Copperspun Rotor for induction motors. The rotor bars and end rings are formed in one piece by pouring molten copper into a mold that encases the punched laminations, stacked and held under pressure.

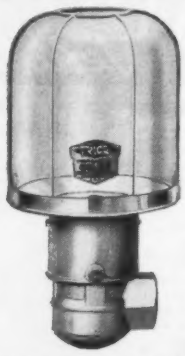
Copper is poured from one end only as the entire assembly is spun at high speed, resulting in a tough, dense, ductile copper winding of high strength, full slots and uniform structure and conductivity.

NEW!

TRICO

Unbreakable

OILERS



MODERN! STREAMLINED!

For maintaining a constant level of oil in ring or ball bearings, pump and gear housing, etc.

WRITE FOR BUL. NO. 25.

TRICO FUSE MFG. CO., Milwaukee, Wis.

Connection Diagrams for Lap Wound Motors

(*Continued from page* 33)

phase groups are shown in dotted lines. For example, in Fig. 1 the connection between groups 3 and 5, also 4 and 6 are dotted. This indicates that for a single voltage series connection these jumpers are used and are considered as solid lines. However, if a dual voltage connection is required, then four additional or eight leads are brought out by cutting the dotted jumpers in half, and tagging each end as shown as L5, L6, L7 and L8.

The small sketch with each diagram and the table show how the motor leads are connected to the line. On the three phase diagrams, Figs. 2 and 3, there are three dotted line jumpers, and the "x in circle" mark indicates where the jumper must be opened to convert the diagram for dual voltage use.

All of the 45 diagrams are based on what is called the "short jumper," or "top to top and bottom to bottom" connection. This will be explained later in more detail, as will other details of these diagrams.

Air Conditioning Offers New Service Field

(*Continued from page* 27)

that none of the joints or connections had a small leak that might cause a shortage of refrigerant and a repeat call in the near future.

The routine as outlined herein started an air conditioning job for a seasonal run might be in excess of what you ordinarily are accustomed to. But this kind of check will almost guarantee to the customer a trouble-free summer for his equipment.

Let me suggest that if you have not been soliciting this type of work, but waiting for the owners to call you, you are doing both he and yourself an injustice because this type of job pays dividends to both parties.

Dramatic Demonstrations Boost Appliance Sales

(*Continued from page* 11)

forts are valuable assistants in making the sale, and all of the salesmen are encouraged to use these and other courteous gestures.

In addition to store demonstrations Mr. Young believes in the consistent use of cold canvass and newspaper advertising. But any method used to attract prospects must bring the prospect into the store, preferably after store hours, before this sales manager believes the method is successful.

Florida's Modern Kitchen Campaign

(*Continued from page* 5)

brought out and discussed, and sales problems analyzed. Usually a series of sales problems will be dramatized and enacted by one of the company's salesmen and the sales manager. Dealer salesmen are urged to attend these sessions.

On every Friday, the utility holds an "open house" cooking demonstration for housewives, blanket invitations being extended to users and prospective users alike. Home economists are in charge of the demonstrations, who illustrate the best methods of using electric cooking facilities, and who prepare various dishes during the show. Different brands of appliances are used each week. These cooking schools are extended even far out into the rural areas, the utility sending its economists out into the territory regularly.

The keynote of the success of the campaign, according to Mr. Geidd, is in placing the emphasis upon the load building resulting from appliance sales, and in compensating the salesmen upon that basis. "That is the only way in which we could enlist the full cooperation of the dealers, and permit them to participate in such a contest," he commented. "It eliminated any 'cut-throat' aspect of competition between our salesmen and theirs, and enabled our men to help them without interfering with their own interests. This helps us to stimulate dealer activity, and to lend them more expert assistance, which will ultimately strengthen their sales organizations, and make for more general and efficient appliance selling, and the consequent load increase."

MANUFACTURERS REPRESENTATIVE covering Southeast States needs additional lines. Reply to Box 62, care ELECTRICAL SOUTH, Grant Bldg., Atlanta, Ga.

DINKLER HOTELS

Landmarks of Southern Friendliness

You will find the Dinkler Hotels located conveniently on all principal highways in the South . . . in each you will find a cordial welcome by a cheerful, friendly staff. The rooms are large and well ventilated . . . each with private bath and radio . . . garage connections are convenient and popular prices prevail in dining rooms and coffee shops.

★ The ANSLEY IN ATLANTA, GA.
★ The SAVANNAH IN SAVANNAH, GA.
★ The ST. CHARLES IN NEW ORLEANS, LA.
★ The ANDREW JACKSON IN NASHVILLE, TENN.
★ The JEFFERSON DAVIS IN MONTGOMERY, ALA.
★ The TUTWILER IN BIRMINGHAM, ALA.
★ The O. HENRY IN GREENSBORO, N. C.

MODERATE RATES

ILLUSTRATED FOLDERS SENT UPON REQUEST

DINKLER HOTELS,
CARLING DINKLER, President and General Manager
OPERATING 3000 ROOMS IN SOUTHERN HOTELS

THE

"HANDBOOK OF INTERIOR WIRING DESIGN"

THIS valuable handbook is the first standard of wiring adequacy equally acceptable to all branches of the electrical industry and is sponsored by the eight National Associations. It fills a long-felt need in dealing with the problem of inadequacy in wiring capacity and the handicap it places on electrical progress.

In preparing this Handbook, the authors endeavored to create a reference book of value to the designer of those installations not normally handled by a consulting electrical engineer or by firms that undertake large special structures and maintain engineering staffs.

In general, the Handbook discusses "why" adequate wiring is needed, "what" must be installed to supply those needs, and "where" it should be placed. It is distinctly not a booklet on "how" to wire in the sense of covering specific wiring materials and their installation. Every effort has been made to include all of the factors that enter into the smaller job while only an outline of procedure has been given for larger installations.

This valuable handbook may be secured with a three year subscription to ELECTRICAL SOUTH for $2.50 or with a five year subscription for $3.50.

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GRANT BLDG. ATLANTA, GA.

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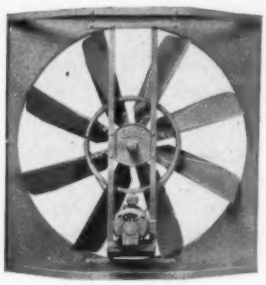
Can be the greatest year for YOU!



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After testing the leading makes, a great southern utilities company* is now selling Coolair fans exclusively!

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*Name on request.

Please send me the new Coolair catalog and dealership information.

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Coolair Ventilating and Cooling Systems
AMERICAN COOLAIR CORPORATION
Manufacturers . . . . JACKSONVILLE, FLORIDA

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